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COLUC TASK FORCE

LOWRY MODEL ANALYSES OF THE COLUC REGION

June, 1974

B.G chinson,P.Eng.
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MINISTRY OF TREASURY, ECONOMICS AND INTER-GOVERNMENTAL AFFAIRS

COLUC TASK FORCE

LOWRY MODEL ANALYSES OF THE COLUC REGION

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Waterloo, Ontario. N2L 1J8.

June, 1974.

SUMMARY

This report describes the results of land use model analyses of alternative public development policies for the COLUC Region. These analyses form part of the studies conducted by the COLUC Task Force which are directed toward refining the preferred structure plan for the COLUC Region. The public development policies analyzed include the development of the proposed North Toronto International Airport, several trunk servicing policies directed toward the acceleration of housing opportunities in different parts of the Region and a number of regional transport policies.

The analyses showed that the proposed North Toronto International Airport would have little impact on the spatial distributions of population and employment within the Region. The estimated 19,000 employees at the airport by 1986 are equivalent to about 32,000 persons and would have marginal impacts only on some of the residential areas adjacent to the two airport sites.

The land use model analyses demonstrated quite clearly that the most powerful public policy variable available within the COLUC Region for manipulating the spatial patterns of development is the supply of trunk services. These policies not only have an important impact on population distribution but have a significant impact on the spatial distribution of population-serving employment. This secondary effect of the trunk servicing policies is quite important since about 40 percent of the total employment is population-serving employment.

The trunk servicing option which would accelerate the supply of serviced residential land in the Peel region would have the most important differential impact on the spatial distribution of population within the COLUC Region. Analyses of the 1986 Coluc Base development condition demonstrated that housing demand pressures would exist in the Peel region and the western areas of Metropolitan Toronto. This servicing policy would simply serve to encourage these housing pressures. The policy would produce a major concentration of service employment in the Mississauga area which would dominate completely the orientation of the urban place service linkages in the western part of the COLUC Region. It seems clear that this trunk servicing policy would destroy one of the fundamental principles of the COLUC development concept which is to have quasi-independent service sub-systems focussed on Hamilton and Mississauga.

A trunk servicing policy geared to the accelerated provision of serviced residential land within the Oshawa-Whitby area would also encourage a significant differential shift in the population and employment distributions within the COLUC Region. This servicing policy would produce a major concentration of service employment in the Oshawa area and help provide the preferred orientation of urban place service linkages within the Oshawa region.

A trunk servicing policy which would accelerate the provision of serviced residential land in the York region would have the smallest impact on population and employment distribution within the COLUC Region. While population and employment would be shifted into the northern urban places by this policy its impact would not be as large as the other two policies.

The regional public transport scenarios postulated for the COLUC Region will have little differential impact on the population and employment distributions within the Region. While high quality rapid transit systems may effect population distributions at the micro-scale of individual stations these systems should not be viewed as a major public policy instrument. It is quite clear, however, that any residential land servicing alternative must be accompanied by complementary transport policies.

A very limited analysis of the probable distribution of population-serving employment by sector throughout the COLUC Region would suggest that the urban place functional class hierarchy of the COLUC Mature State plan is not a viable concept except in a limited way for the retail employment sector.

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1. COLUC STRUCTURE PLAN ANALYSES

1.1 THE MATURE STATE PLAN

The COLUC Task Force has described the structure plan for the COLUC Region in the following way (1):

"The Mature-State Plan is a statement of the preferred roles and characteristics of each urban place within the southern COLUC area during the period of maturity. The preferred roles are defined in terms of desirable economic linkages between urban places. These linkages are designed to make accessible the highest affordable levels of various centralized services. Simply stated, the Plan defines the various degrees of specialized services for provision in each urban place and their corresponding service areas and reaches. In order to put the Plan into dimensional perspective, population and employment ranges are defined for each urban place, and the corresponding land consumption is identified".

Figure 1 shows the system of urban places proposed initially for the mature-state concept. This system consists of 23 urban places which are conceived as being grouped into four sub-systems focussed on Hamilton, Mississauga, Toronto and Oshawa. A basic objective of the plan is that these four sub-systems will be relatively self-sufficient for services with Toronto providing only the more specialized services for the region. The urban places within each sub-system will exist in well-ordered hierarchies and Figure 2 illustrates these preferred orientations as well as the urban place functional classes proposed for each urban place.

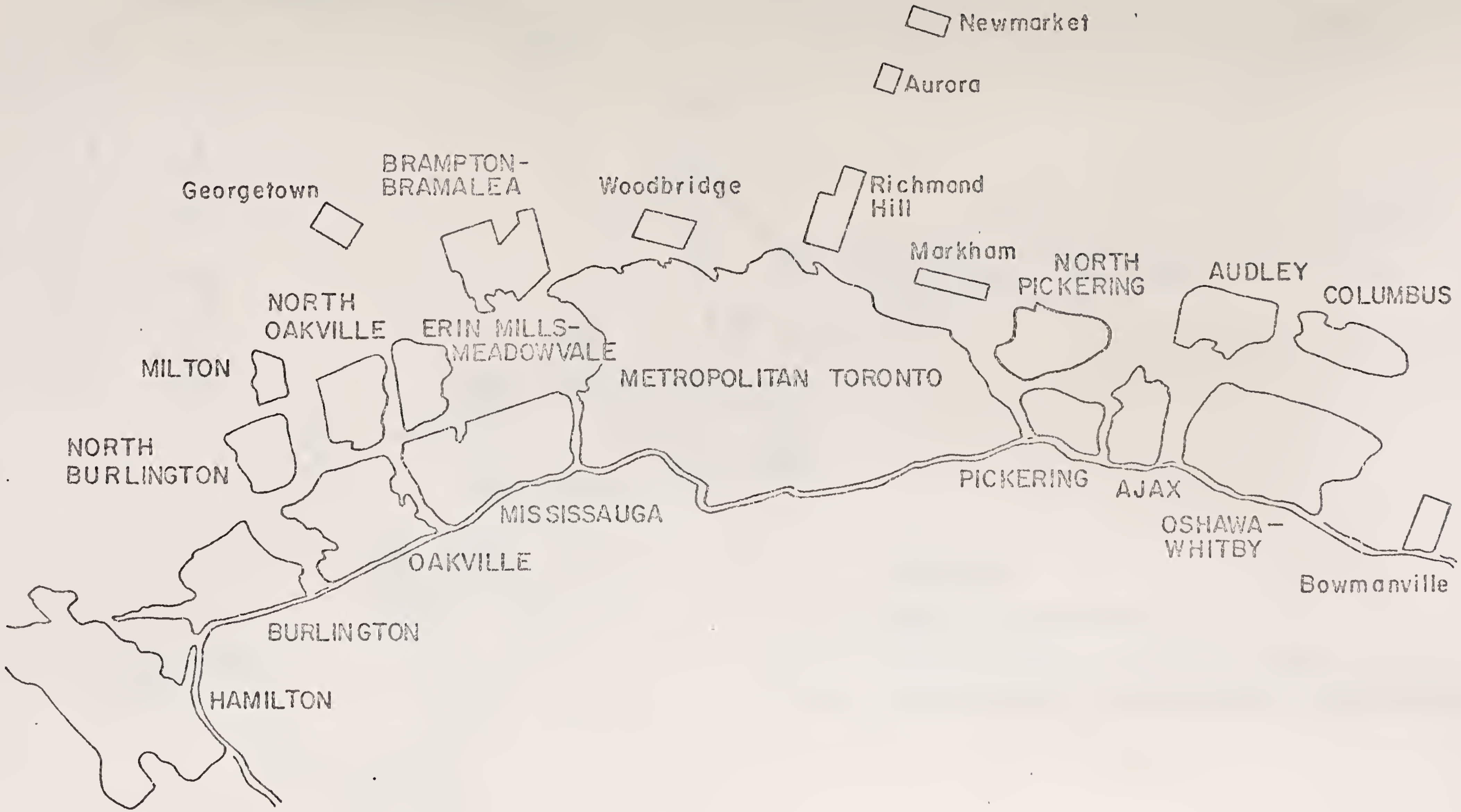


FIGURE I - COLUC SUB-REGION SYSTEM OF URBAN PLACES

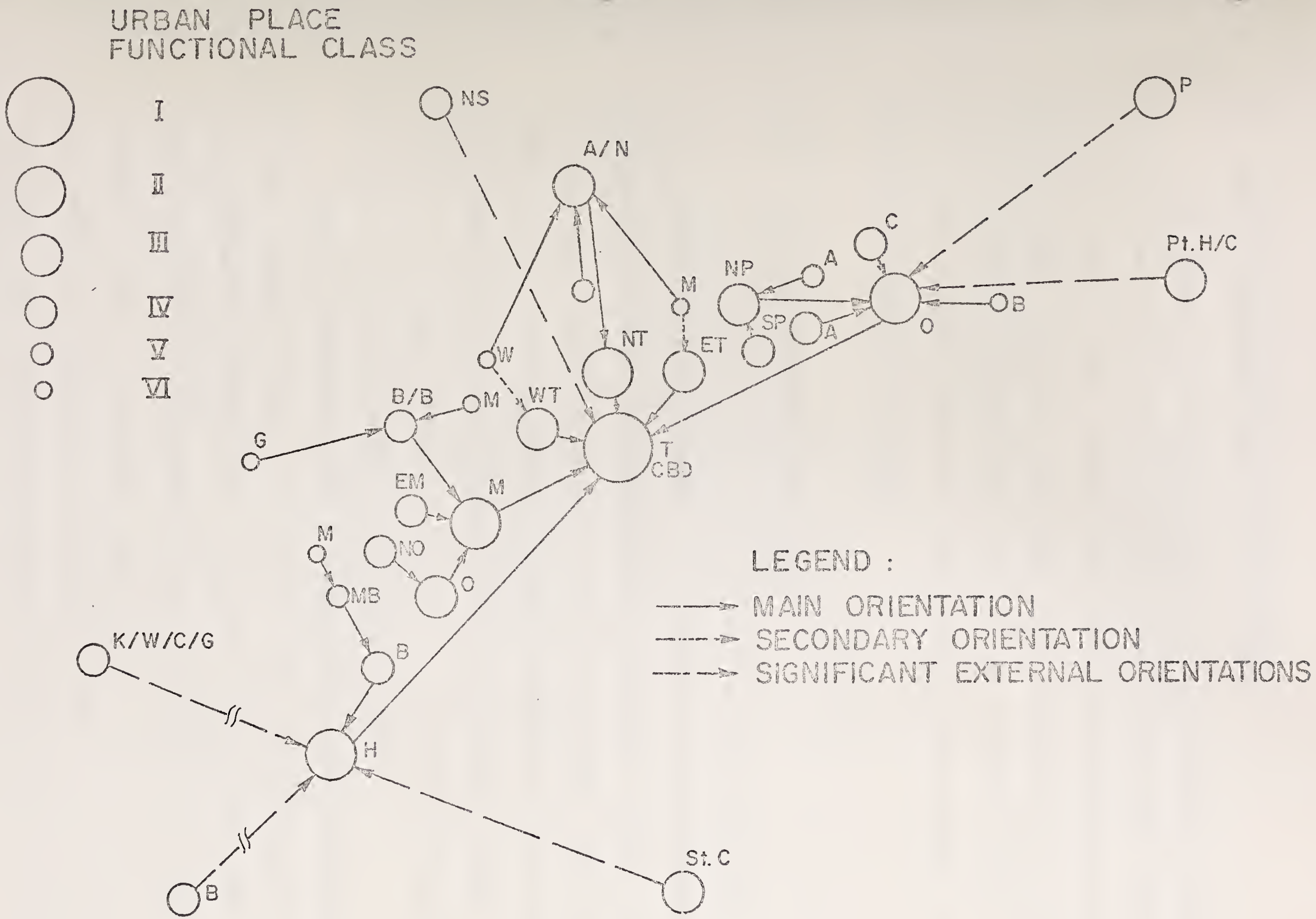


FIGURE 2 - COLUC SUB-REGION PREFERRED URBAN PLACE ORIENTATION

1.2 ROLE OF LOWRY MODEL IN STRUCTURE PLANNING

The mature state structure plan for the COLUC Region outlined above represents the preferences of the planning team rather than an end state that has been predicted using objective forecasting techniques. Land use models such as the Lowry model have a specific role to play in structure planning activities and that role is to assist planning teams to articulate a consistent set of public policies that are most likely to yield the preferred end state.

1.2.1 Land Use-Transport Demand Model

A version of the Lowry land use model has been used in the analyses described in this report. The version used was developed and programmed for computer at the University of Waterloo. Figure 3 shows the fundamental conceptual structure of the Lowry model. This diagram illustrates that the Lowry model conceives of the major spatial features of an urban area in terms of three broad activity sectors usually labelled as the basic employment sector, the population-serving employment sector and the population (or household) sector.

Figure 3 illustrates that an exogenously specified distribution of basic employment by zone is used by the model to calculate the spatial distributions of households and of population-serving employment. The diagram indicates that the home-based work and service trip tables are calculated as well. The activity distributions calculated by the model may be subject to constraints on the maximum number of people allocated to each zone and to the minimum population-serving employment thresholds for any one zone.

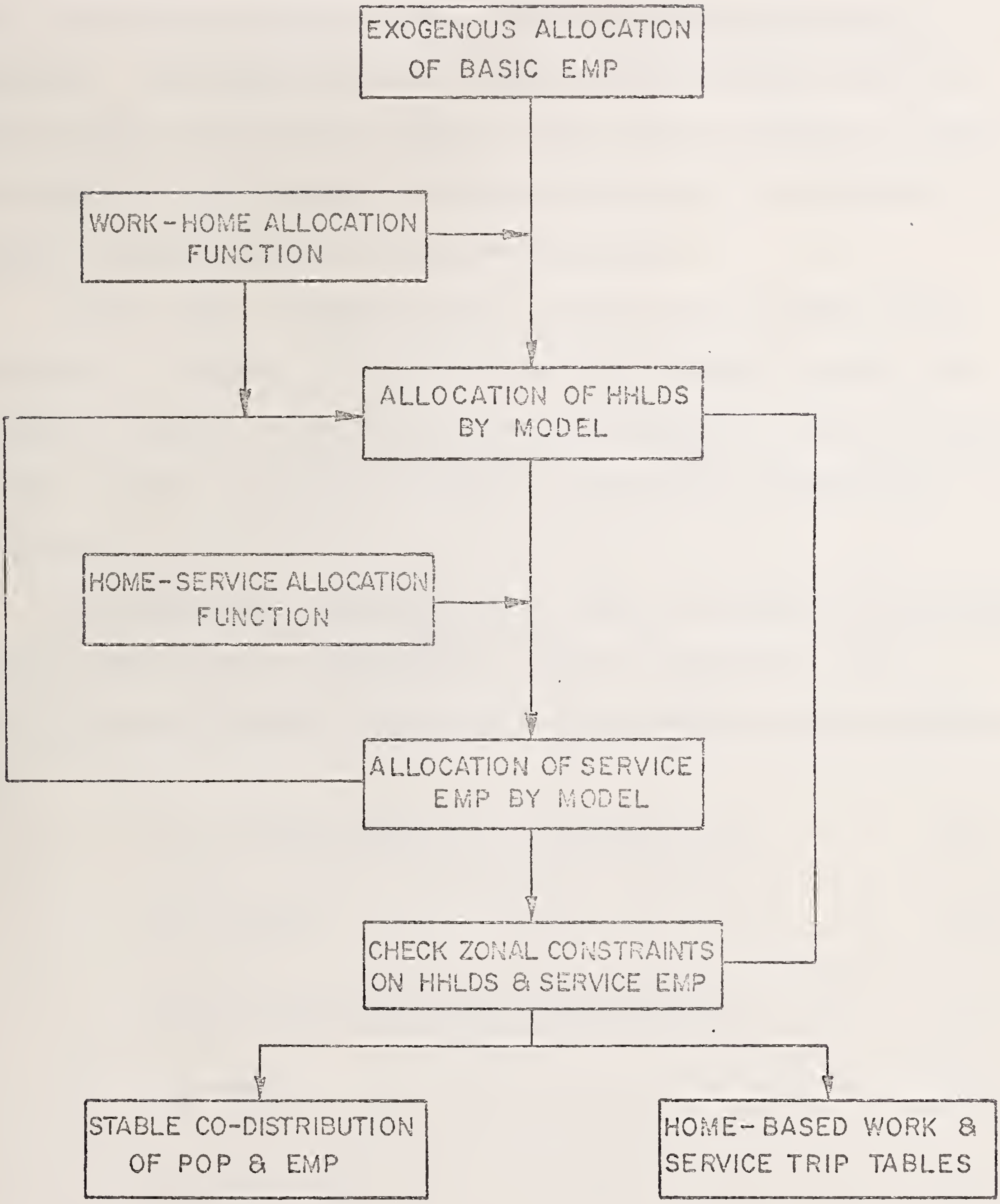

EXOGENOUS ALLOCATION OF BASIC EMP
WORK-HOME ALLOCATION FUNCTION
ALLOCATION OF HHLDS BY MODEL
HOME-SERVICE ALLOCATION FUNCTION
ALLOCATION OF SERVICE EMP BY MODEL
CHECK ZONAL CONSTRAINTS ON HHLDS & SERVICE EMP
STABLE CO-DISTRIBUTION OF POP & EMP
HOME-BASED WORK & SERVICE TRIP TABLES

FIGURE 3 - CONCEPTUAL STRUCTURE OF LOWRY MODEL

Employment types which are typical of basic, or locationally fixed employment are manufacturing, senior government and airport employment. The main criterion for classifying employment sectors as basic is that their location within a region is not sensitive to shifts in the spatial distributions of households that might be stimulated by changes in land servicing or transport policies.

Retail trade, personal services, primary and secondary school employment are examples of population-serving employment sectors. The principal criterion of population-serving employment is that its location within a region is sensitive to shifts in the spatial distributions of households.

The mathematical structure of the land use-transport demand model used for the analyses is described in detail in Appendix A. The equations used to allocate population and population-serving employment are:

$$\ell_{ij} = e_i a[h_j \exp(-\alpha_i d_{ij}) / \sum_j h_j \exp(-\alpha_i d_{ij})] \tag{1}$$

$$p_j = \sum_i \ell_{ij} \tag{2}$$

$$\ell^r_{ij} = p_j b[s_i \exp(-\beta_j d_{ij}) / \sum_j s_i \exp(-\beta_j d_{ij})] \tag{3}$$

$$e^s_i = \sum_j \ell^r_{ij} \tag{4}$$

$$e_i = e^b_i + e^s_i \tag{5}$$

where ℓ_{ij} = the number of employees working in zone i who live in zone j

e_i = the total number of employees in zone i

a = the inverse of the labour participation rate

h_j = the residential population holding capacity of zone j

α_i = a behavioural parameter which reflects the influence that travel time has on residential location decisions of employees working in zone i

d_{ij} = the travel time between zones i and j

p_j = the population allocated to zone j

ℓ^r_{ij} = the number of people seeking services in zone i who live in zone j

e^b_i = the basic employment allocated exogensouly to zone i

Equation (1) allocates employees working in each zone to the available housing opportunities as a function of the inter-zonal travel times to these opportunities. The linkage matrix calculated in equation (1) is used to calculate the spatial distribution of population as shown in equation (2). The linkage matrix is also used to calculate the home-based work trip table as shown in Appendix A. Equation (3) allocates the demand for service employment generated by the household sector to competing service employment centres. The linkage matrix calculated by equation (3) may be used to calculate the population-serving employment distribution as shown in equation (4). This matrix is also used to calculate the home-based service trip table as shown in Appendix A.

The allocations of population and service employment calculated by equations (1) to (4) are solved by an iterative technique since the distribution of total employment by zone required by equation (1) is not known initially. Equation (5) provides the link between the population and service sub-models and ensures that a stable co-distribution of population and employment is produced by the model.

The model calculations may begin with a basic employment distribution, or with a basic employment distribution plus an estimate of the

distribution of service employment. The model iterations are terminated when the total employment distribution used at the beginning of an iteration of the model is equal to the distribution of total employment calculated at the end of an iteration. The travel demand matrices are calculated at the conclusion of the last iteration of the model.

1.2.2 Application to COLUC Studies

The role that the land use-transport demand model played in development policy testing is illustrated in Figure 4. The proposed programs of each of the Ontario ministries were first converted into input variables that are acceptable to the model. Each set of these programs along with the appropriate model parameter magnitudes were used by the model to calculate distributions of population and employment as well as the associated travel demands. Figure 4 indicates that the impacts predicted by the model were then appraised by the COLUC Task Force.

The objective, then, of the analysis process is to isolate a set of public policies that are most likely to yield the preferred structure plan, where these policies consist of the following elements:

1. A distribution of basic employment with those components of employment under direct government control and influence being identified clearly.
2. A set of residential land trunk servicing policies along with the target population densities for each zone.
3. A set of urban place population sizes and inter-urban place transport policies which will yield the preferred distribution

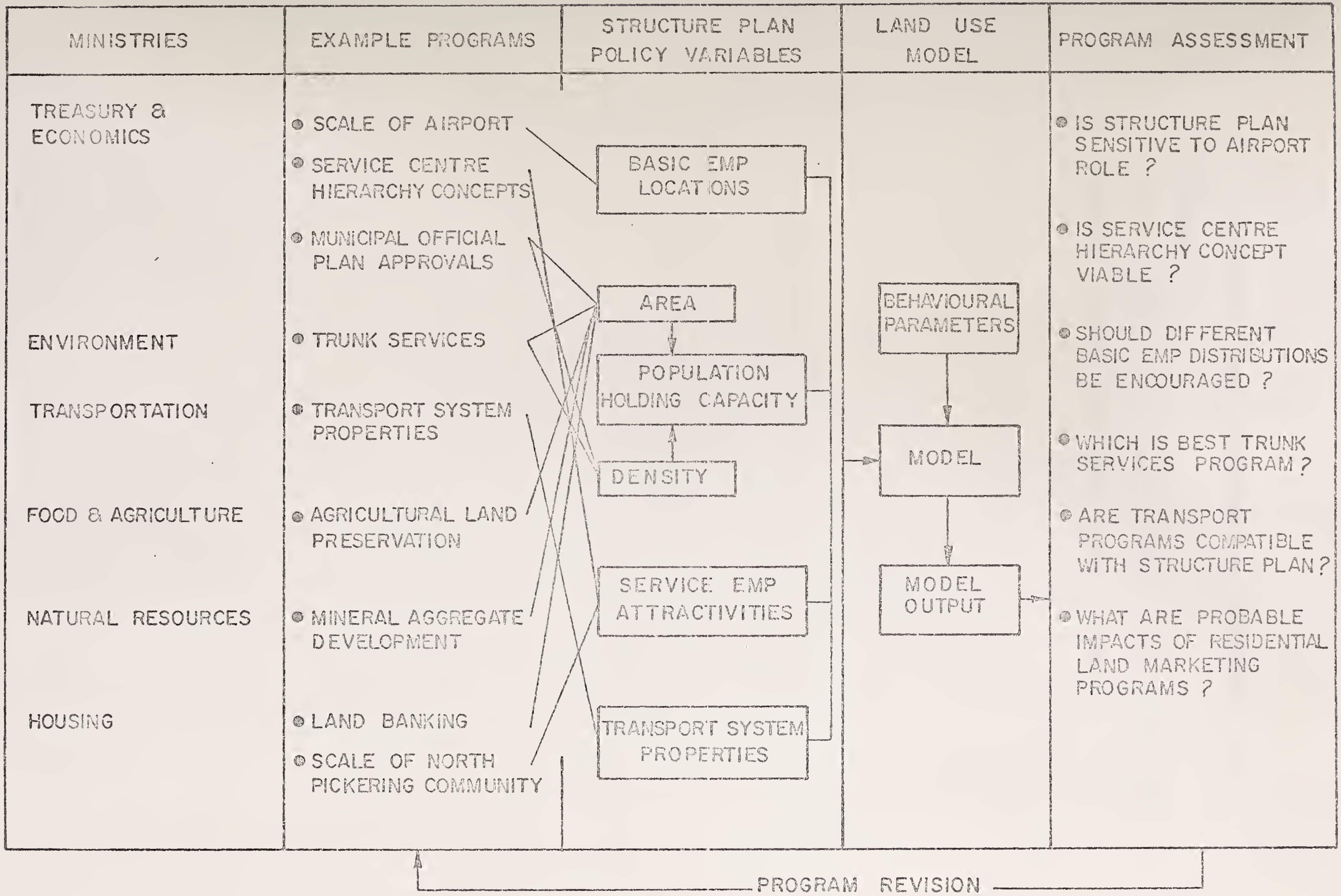

MINISTRIES
EXAMPLE PROGRAMS
STRUCTURE PLAN POLICY VARIABLES
LAND USE MODEL
PROGRAM ASSESSMENT
TREASURY & ECONOMICS
ENVIRONMENT
TRANSPORTATION
FOOD & AGRICULTURE
NATURAL RESOURCES
HOUSING
SCALE OF AIRPORT
SERVICE CENTRE HIERARCHY CONCEPTS
MUNICIPAL OFFICIAL PLAN APPROVALS
TRUNK SERVICES
TRANSPORT SYSTEM PROPERTIES
AGRICULTURAL LAND PRESERVATION
MINERAL AGGREGATE DEVELOPMENT
LAND BANKING
SCALE OF NORTH PICKERING COMMUNITY
BASIC EMP LOCATIONS
AREA
POPULATION HOLDING CAPACITY
DENSITY
SERVICE EMP ATTRACTIVITIES
TRANSPORT SYSTEM PROPERTIES
BEHAVIOURAL PARAMETERS
MODEL
MODEL OUTPUT
IS STRUCTURE PLAN SENSITIVE TO AIRPORT ROLE ?
IS SERVICE CENTRE HIERARCHY CONCEPT VIABLE ?
SHOULD DIFFERENT BASIC EMP DISTRIBUTIONS BE ENCOURAGED ?
WHICH IS BEST TRUNK SERVICES PROGRAM ?
ARE TRANSPORT PROGRAMS COMPATIBLE WITH STRUCTURE PLAN ?
WHAT ARE PROBABLE IMPACTS OF RESIDENTIAL LAND MARKETING PROGRAMS ?
PROGRAM REVISION

FIGURE 4 – ROLE OF MODEL IN DEVELOPMENT POLICY TESTING

of service employment by sector and inter-urban place linkages.

4. A set of region-wide transport policies which are fully supportive of the other public policy elements.

2. 1986 HORIZON YEAR ANALYSES

2.1 COLUC BASE CONDITION

Figure 5 shows the zone system used for the analyses described in this report. This zone system is not completely compatible with the urban place system illustrated in Figure 1. The zone system in Figure 5 was used as parallel analyses using the Empiric land use model were being conducted and Empiric had been calibrated to the zone system illustrated. Earlier studies conducted by the North Pickering Community Development Project using the Lowry model used the urban place zone system illustrated in Figure 1.

Some of the information developed by the land use model analyses described later in this report are summarized with respect to the large sub-regional areas illustrated in Figure 5. These five sub-areas have been labelled Metro Toronto, Eastern Area, Northern Area, Western Area and Hamilton Area.

One of the development options tested for the 1986 analyses is referred to as the COLUC Base concept and represents a view of the COLUC Mature-State concept with respect to the 1986 horizon year. This case reflects the population preferences for 1986 and a preferred distribution of basic employment including 15,000 jobs at the North Toronto International Airport. In the absence of a consistently prepared set of housing development policies for each urban place the 1986 population preferences were assumed to be the residential holding capacities for each zone in 1986. Within Metropolitan Toronto these holding capacities reflected the planning policies being applied to the various planning districts. The

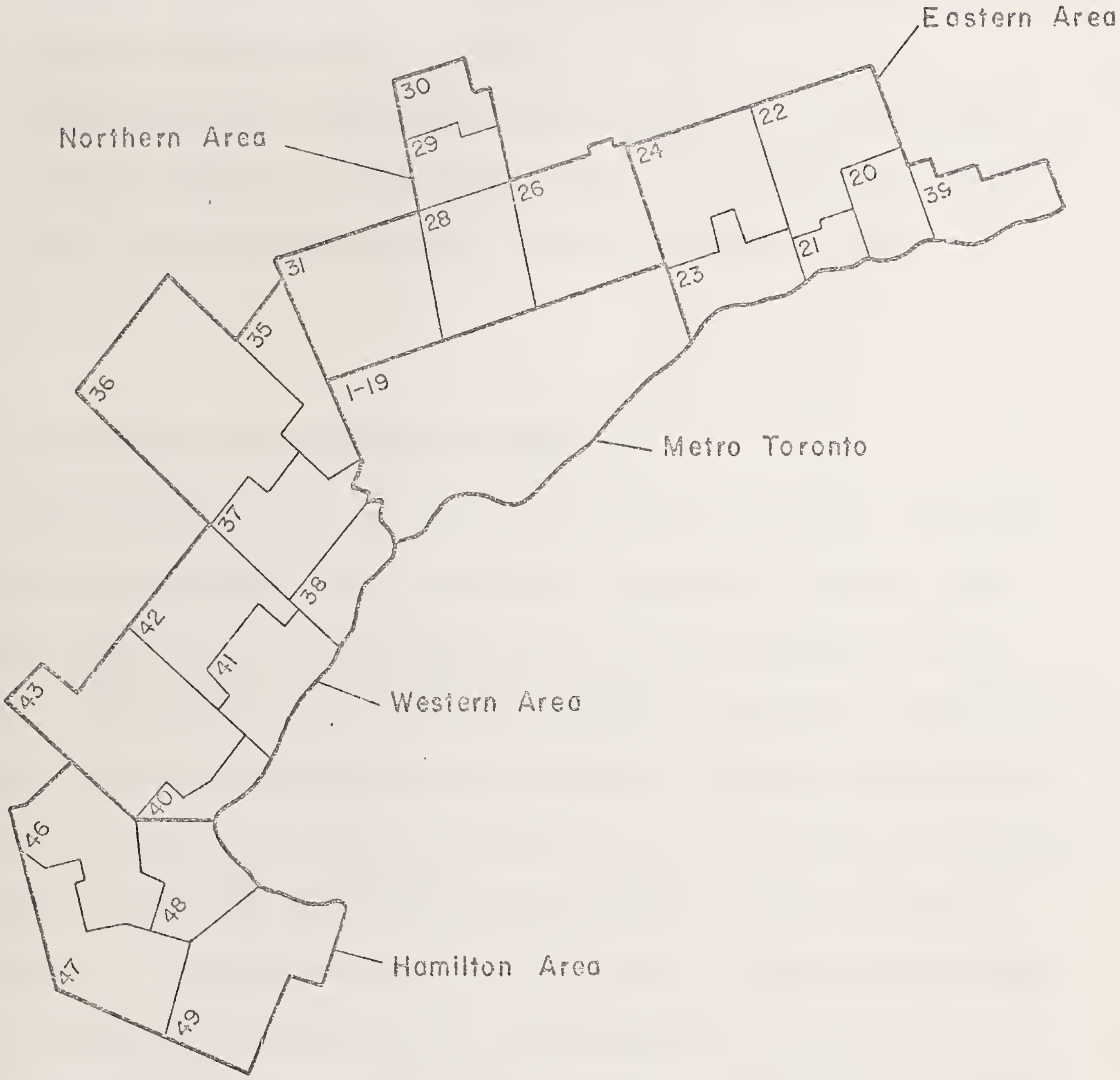


FIGURE 5 - SYSTEM OF ANALYSIS ZONES FOR COLUC REGION

basic employment distribution for 1986 was supplied by the COLUC Task Force. Table 1 summarizes the 1986 residential holding capacities and basic employment magnitudes for 1986.

The inter-zonal travel times were supplied by the COLUC Task Force and are based on the 1986 road network. The behavioural parameters used for the land use model analyses are presented in Appendix B.

2.1.1 Population and Employment Allocations

Population allocations were developed by the model using both unconstrained and constrained versions of the model. However, the unconstrained allocations form the basis of the discussion in this report. The population and service employment allocations calculated by the land use model are presented in Appendix C. The population allocations for each of the five sub-areas of the COLUC Region are presented in Table 2 along with the 1971 population and the 1986 population preferences. The differences between the model allocated populations and the population preferences are also presented in Table 2.

Table 2 indicates that the model-allocated population to Metro Toronto is about 100,000 less than the 1986 preference, to the Eastern Area is about 80,000 greater than the preference, to the Northern Area is about 80,000 less than the preference, to the Western Area about 70,000 greater than the preference and to Hamilton about 70,000 greater than the preference. The only sub-area that is significantly different to the preference on a percentage basis is the Northern Area which is about 50 percent under-allocated by the model.

TABLE 1 - COLUC BASE RESIDENTIAL HOLDING CAPACITIES
AND BASIC EMPLOYMENT FOR 1986

ZONE NO.	BASIC EMPLOYMENT	HOLDING CAPACITY	ZONE NO.	BASIC EMPLOYMENT	HOLDING CAPACITY
1	118,860	86,000	26	6,500	28,000
2	101,440	270,000	27	0	0
3	17,510	285,000	28	8,400	50,000
4	92,710	158,000	29	3,000	26,000
5	37,905	120,000	30	5,000	29,000
6	38,895	145,000	31	2,400	9,000
7	23,305	158,000	32	0	0
8	30,275	68,000	33	0	0
9	58,745	128,000	34	0	0
10	44,265	112,000	35	18,700	18,000
11	7,095	100,000	36	21,300	92,000
12	11,000	132,000	37	14,000	54,000
13	22,665	112,000	38	33,700	225,000
14	33,765	169,000	39	2,950	15,000
15	25,050	184,000	40	9,300	76,000
16	33,820	195,000	41	12,400	66,000
17	5,280	52,000	42	2,000	9,000
18	6,280	74,000	43	3,000	24,000
19	9,420	46,000	44	0	0
20	59,000	194,000	45	0	0
21	7,500	40,000	46	17,000	75,000
22	0	0	47	1,500	20,000
23	9,300	82,000	48	101,000	280,000
24	19,000	30,000	49	13,000	50,000
25	0	0	TOTAL	1,088,235	4,086,000

TABLE 2 - COLUC BASE SUB-AREA POPULATION ALLOCATIONS

SUB-AREA	1971 POPULATION	1986 MODEL ALLOCATED	1986 PREFERENCES	MODEL-PREFERENCES
Metro Toronto	2,100,000	2,426,262	2,532,000	-105,738[1]
Eastern Area	172,000	441,859	361,000	80,859[2]
Northern Area	98,000	87,753	169,000	-81,247
Western Area	372,000	634,620	566,000	68,620
Hamilton Area	374,000	470,975	400,000	70,975

[1] under-allocation by model

[2] over-allocation by model

A review of the allocations to the individual zones in the COLUC Region indicates that Malton, Mississauga, Erin Mills, Brampton-Bramalea, Hamilton and Oshawa-Whitby are the individual zones whose population holding capacities are exceeded. The zone with the largest over-allocation of population is Oshawa-Whitby with an over-allocation of 124,000, or about 53 percent.

The principal effect of the population allocation constrained runs of the model was to re-allocate population to the under-allocated zones within the eastern sections of Toronto and the Northern area.

The total employment allocations to each urban place are shown in Table 3. The 1986 total employment preferences by COLUC sub-area are also shown in Table 3 along with the differences between these preferences and the model allocated employment. The total of the model-allocated employments is about 240,000 higher than the 1986 preferences. Table 3 also indicates that several of the COLUC sub-areas have significantly higher employments than the preferences and these are the Eastern, Western and Hamilton Areas. It should be recalled from Table 2 that these were the same areas that had model-allocated populations greater than the preferences. Much of the model-allocated employment is population-serving employment. The population-serving employment demand rate used in the model was 0.191 employees per persons. The over-allocations of population to these areas would create the following additional service employment demands of 15,400, 13,100 and 13,600 in the Eastern, Western and Hamilton Areas, respectively.

TABLE 3 - COLUC BASE SUB-AREA EMPLOYMENT ALLOCATIONS

SUB-AREA	1986 MODEL ALLOCATED	1986 PREFERENCES*	MODEL-PREFERENCES
Metro Toronto	1,091,696	1,098,000	- 6,304
Eastern Area	200,352	109,600	90,752
Northern Area	30,130	39,900	- 9,770
Western Area	315,410	195,700	119,710
Hamilton Area	226,389	177,300	49,089
TOTAL	1,863,977	1,620,500	243,477

* From M.T.C. estimates in Table 5 of "The Preferred Phasing of Population and Employment Allocations in COLUC", Woods, Gordon and Co., April, 1974.

2.1.2 Comparison With Other Studies

Several studies performed for the COLUC Task Force have developed allocations of population and employment for the Region. Table 4 provides a comparison of the population and employment allocations prepared in these studies with the allocations developed in this study. It is interesting to note the relatively close agreement between the population and employment allocations for the three studies summarized in Table 4. All three studies produced very similar population allocations to the Metropolitan Toronto sub-area. The allocations to the Eastern sub-area by both models are essentially equal but about 40 percent higher than the MVJ/PMP allocation. The model allocations to the Northern sub-area differed by 30,000 people with the Lowry producing an allocation closest to that estimated in the MVJ/PMP study. The model allocations to the Western sub-area are 65,000 and 112,000 less than the MVJ/PMP allocation for the Lowry and Empiric models, respectively. The Hamilton sub-area allocations are essentially equal for the Lowry and MVJ/PMP allocations with the Empiric allocation being about 60,000 higher. Similar differences existed between the employment allocations by sub-area and these are illustrated in Table 4.

Figure 6 shows the Lowry model allocated population versus the MVJ/PMP allocated population for each of the urban places in 1986. The major difference between the two allocations is for Oshawa/Whitby where the model allocation is almost double the MVJ/PMP allocation. The principal sources of the difference between the two population allocations are the amount of basic employment allocated to Oshawa/Whitby in the COLUC Base and the dominant service centre role played by Oshawa in the

TABLE 4 - COMPARISON OF COLUC SUB-AREA POPULATION AND EMPLOYMENT ALLOCATIONS

	STUDY	COLUC SUB-AREA				
		METRO	EASTERN	NORTHERN	WESTERN	HAMILTON
POPULATION	LOWRY	2,426,000	442,000	88,000	635,000	471,000
	EMPIRIC	2,553,000	421,000	218,000	588,000	537,000
	MVJ/PMP*	2,480,000	310,000	119,000	700,000	475,000
EMPLOYMENT	LOWRY	1,092,000	200,000	30,000	315,000	226,000
	EMPIRIC	1,307,882	138,586	106,923	240,591	162,699
	MVJ/PMP*	1,277,000	141,000	48,000	308,000	250,000

* Murray V. Jones and Associates Limited, Peat Marwick and Partners report

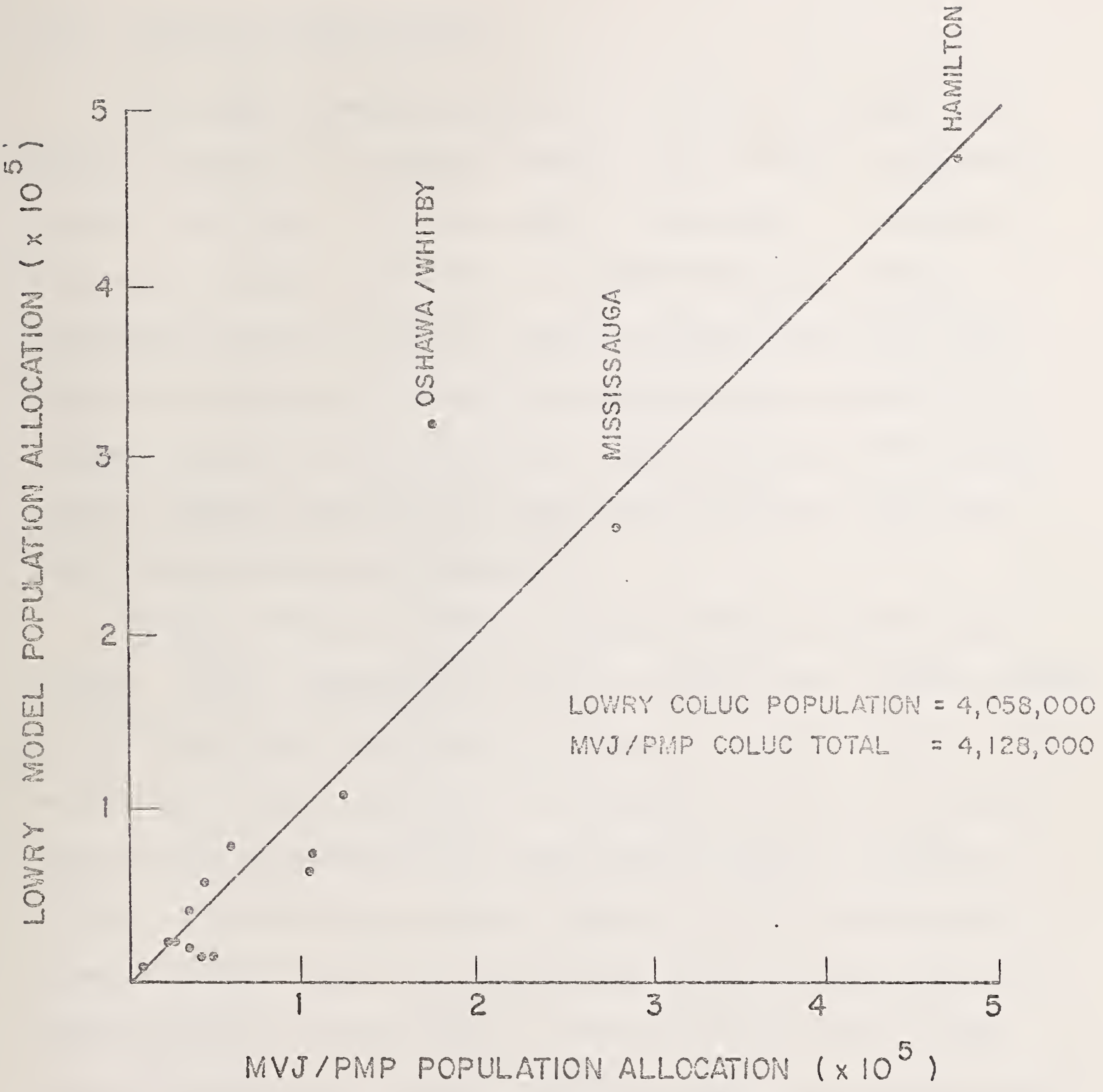


FIGURE 6 - LOWRY MODEL vs MVJ/PMP POPULATION ALLOCATIONS

Lowry model simulation. It would appear that the MVJ/PMP population and employment allocations to the Oshawa area are very conservative.

2.1.3 Corridor Travel Demands

The travel demands calculated by the land use-transport model were not assigned to a transport network in the analyses conducted for the COLUC Task Force. The trip tables are available in the computer print-outs. Studies completed for the North Pickering Community Development Project on possible commuting patterns within the COLUC Region did involve an all-or-nothing assignment to a corridor-level transport network. These studies were conducted for the 1986 horizon year but involved population and employment data coded to the urban place system illustrated in Figure 1.

Figure 7 shows the skeletal transport network used for these studies. Table 5 summarizes the two-way work home daily volumes assigned to the links of the network shown in Figure 7. The peak two-way volumes on the links of this network are in the highway 401 corridor through Toronto which is represented by links 212-220, 220-221, 221-222 and 222-223. The peak two-way assigned volume is on link 220-221 with a volume of 119,000 trips. The implications of these volumes within any corridor may be examined readily by assigning these volumes by hand across the existing and proposed facilities within the corridor in such a way that the average speed along each facility is roughly the same. This traffic volume information has been included in order to provide the Task Force with a feeling for the probable travel demands that are implied by the activity allocations contained in the COLUC Base concept.

TABLE 5 - CORRIDOR NETWORK ASSIGNMENT VOLUMES
WORK-HOME TRIPS

LINK NUMBER	2-WAY VOLUMES	LINK NUMBER	2-WAY VOLUMES
200-201	7,268	218-229	5,623
201-204	16,662	220-221	118,993
202-203	29,398	221-222	106,413
203-204	9,075	221-229	12,597
204-205	25,437	222-223	54,057
204-207	198	223-224	32,922
205-206	14,868	233-227	27,824
206-208	12,735	233-231	17,158
207-209	2,773	224-225	29,673
208-209	1,345	224-232	744
208-210	12,120	225-228	40,183
209-216	6,532	225-234	24,660
210-211	66,125	226-227	95,715
211-212	63,725	227-228	26,307
211-226	32,928	229-230	9,948
212-216	17,917	230-231	11,850
212-219	437	231-232	15,178
212-220	107,852	232-233	9,165
213-214	4,504	233-234	11,742
214-215	5,796	233-237	4,592
214-216	2,533	233-239	19,985
215-217	4,073	234-235	15,241
215-216	24,553	235-236	20,454
217-218	5,837	236-238	3,926
217-219	437		

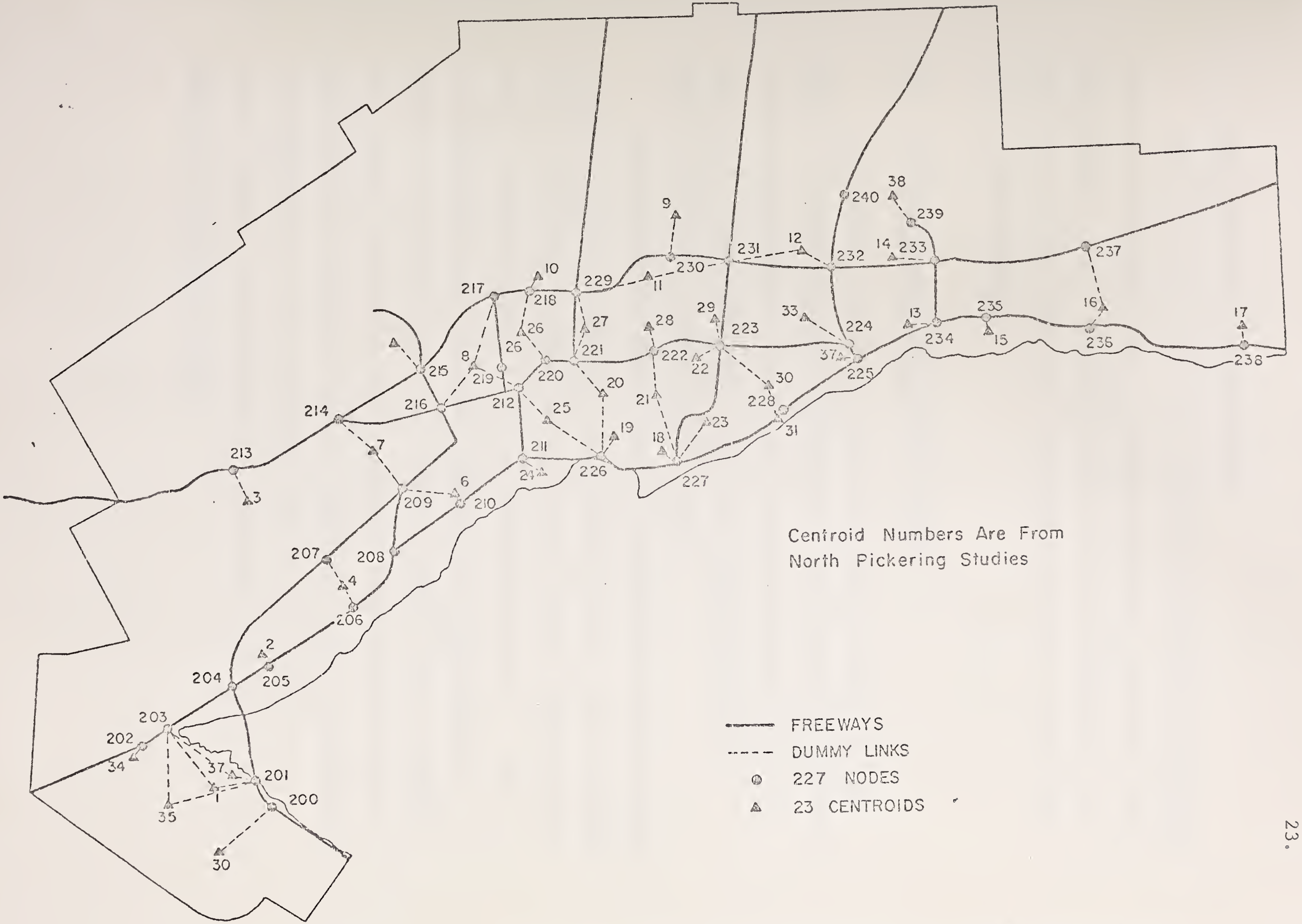


FIGURE 7 - SKELETAL CORRIDOR TRAFFIC ASSIGNMENT NETWORK

2.2 BASIC EMPLOYMENT LOCATION POLICIES

Only one change in the basic employment distribution was analyzed and this was the removal of the employment expected at the North Toronto International Airport. This was the only alternative proposed by the Task Force, although other basic employment distribution options could have been tested easily.

2.2.1 No North Toronto International Airport

The removal of the North Toronto International Airport had the effect of reducing the basic employment of zone 24 from 19,000 employees to 4,000 employees and of increasing the basic employment of zone 35 from 18,700 to 33,700 employees. The 15,000 employees shifted to Malton is equivalent to about 32,500 persons.

The objective of this analysis was to examine the potential impact of airport location on population distribution patterns within the COLUC Region. The changes in population by sub-area from the COLUC Base that might be expected from this policy are summarized in Table 6. This table demonstrates that the airport employment has little impact on population distribution when viewed from the regional scale. Slightly larger impacts on population distribution may be perceived when population shifts are examined in terms of individual zones. In addition to the 7,500 people lost from the Eastern Area the four zones on the eastern boundary of Metro Toronto also lose about 18,000 people when the employment is shifted to Malton.

TABLE 6 - POPULATION SHIFTS DUE TO AIRPORT EMPLOYMENT SHIFT

SUB-AREA	POPULATION CHANGE
Metro Toronto	- 2,000*
Eastern Area	- 7,500
Northern Area	- 1,500
Western Area	+13,000
Hamilton Area	- 675

* population allocated to Metro Toronto zones decreased 2,000 from the COLUC Base concept

2.2.2 Additional Basic Employment Scenarios

It has been mentioned previously that the only basic employment shift from the COLUC Base concept distribution was the transfer to Malton of all international airport employment. Additional basic employment distribution scenarios that could be tested are changes in the spatial distribution of Provincial and Federal Government employment, the employment levels in the Toronto central business district, and so on.

2.3 RESIDENTIAL LAND SERVICING POLICIES

Four alternative trunk servicing policies for 1986 were tested and these are:

1. Peel Pipe: a trunk servicing policy which would implement the year 2000 trunk network in the urban places within South Peel by 1986.
2. York Pipe: a trunk servicing policy involving a similar acceleration of trunk services to the Central York area.
3. Oshawa Pipe: a trunk servicing policy involving a similar acceleration of trunk services to urban places within the Eastern Area of the COLUC Region.
4. All Pipes: a trunk servicing policy for the Region which combines all of the above servicing options for implementation by 1986.

Changes in trunk servicing policy are translated into changes in the residential holding capacities of zones for input to the Lowry model. The residential holding capacities for the zones influenced by these

alternative servicing policies are summarized in Table 7. It should be noted that the servicing policies increase the total residential holding capacity in 1986 by 614,000, 588,000 and 902,000, respectively. The All Pipes Servicing policy increases the total number of housing opportunities available in the Region from the COLUC Base supply of 4,086,000 to 5,764,000.

Table 8 summarizes the shifts in population and employment by each of the five COLUC sub-areas from the COLUC Base concept for the four alternative trunk servicing policies. The model allocations to each of the analysis zones are presented in Appendix C.

2.3.1 Peel Pipe Policy

The Peel Pipe trunk servicing policy would increase the population holding capacities of zones 36,37 and 38 from 371,000 to 985,000. The COLUC Base analyses indicated that there were population pressures in the western Metro zones and in Mississauga, Erin Mills and Brampton-Bramalea. This dramatic increase in residential opportunities would tend to concentrate these population pressures in zones 36, 37 and 38. Table 8 indicates that the model-allocated population to the Western Area increases by about 500,000 over the COLUC Base condition with most of the increase being derived from the Metro zones.

The employment shifts summarized in Table 8 indicate that the Western Area would gain about 160,000 service employment jobs, the bulk of which would be derived from Metro Toronto and Hamilton. These shifts in employment are due to the South Peel urban places becoming large service employment sectors and attracting business from the western Metro zones as well as the Oakville-Burlington area.

TABLE 7 - POPULATION HOLDING CAPACITIES FOR ALTERNATIVE SERVICING POLICIES

ZONE NO.	COLUC BASE	PEEL PIPE	YORK PIPE	OSHAWA PIPE
20	194,000			300,000
21	40,000			150,000
22	0			220,000
23	82,000		200,000	240,000
24	30,000		200,000	200,000
26	28,000		90,000	
28	50,000		193,000	
29	26,000		40,000	
30	29,000		43,000	
31	9,000		76,000	
36	92,000	275,000		
37	54,000	270,000		
38	225,000	440,000		
TOTAL CHANGE	-	614,000	588,000	902,000

TABLE 8 - SHIFTS IN POPULATION AND EMPLOYMENT IN COLUC SUB-AREAS FOR DIFFERENT SERVICING POLICIES FROM COLUC BASE CONDITION

POPULATION SHIFTS

COLUC SUB-AREA	TRUNK SERVICING POLICY			
	Peel Pipe	York Pipe	Oshawa Pipe	All Pipes
Metro Toronto	- 449,000	- 205,000	- 295,000	- 717,000
Eastern	- 34,000	+ 137,000	+ 387,000	+ 267,000
Northern	- 17,000	+ 141,000	- 10,000	+ 123,000
Western	+ 552,000	- 53,000	- 57,000	+ 432,000
Hamilton	- 79,000	- 19,000	- 25,000	- 105,000

EMPLOYMENT SHIFTS

COLUC SUB-AREA	TRUNK SERVICING POLICY			
	Peel Pipe	York Pipe	Oshawa Pipe	All Pipes
Metro Toronto	- 131,000	- 21,000	- 80,000	- 166,000
Eastern	- 8,000	+ 32,000	+ 101,000	+ 69,000
Northern	- 2,000	+ 14,000	+ 3,000	+ 7,000
Western	+ 164,000	- 21,000	- 19,000	+ 117,000
Hamilton	- 22,000	- 4,000	- 5,000	- 27,000

2.3.2 York Pipe Policy

The York Pipe trunk servicing policy would increase the residential opportunities available in zones 23, 24, 26, 28-31, from 254,000 to 840,000. The population shifts summarized in Table 8 suggest that with this servicing policy the populations of the Eastern and Northern Areas would both increase by about 140,000 relative to the COLUC Base concept. Table 8 suggests that the population of the Metro Toronto zones would decrease by about 200,000.

The shifts in service employment under this servicing policy would not be as dramatic as with the Peel Pipe policy. The Eastern and Northern Areas might be expected to increase in service employment by about 32,000 and 14,000, respectively.

2.3.3 Oshawa Pipe Policy

The Oshawa Pipe trunk servicing policy would increase the residential opportunities available in the Eastern Area from 346,000 to about 1,110,000. Table 8 indicates that this dramatic increase in residential opportunities might result in about 400,000 additional people being attracted to the sub-area over the COLUC Base condition. Table 8 suggests that the population of the Metro Toronto zones might decrease by about 300,000. As would be expected, this servicing policy would not likely influence the populations of the Western and Hamilton areas. Table 7 illustrates that the population shift stimulated by this servicing policy would probably attract about 100,000 service jobs to the Eastern area.

2.3.4 All Pipes Policy

The All Pipes trunk servicing policy would provide a massive increase in the residential opportunities available in the urban places which are adjacent to the Metro Toronto boundaries. The total increase in residential opportunities would be around 1,700,000. The information presented in Table 8 would suggest that this policy would have a dramatic impact on the population of the Metro Toronto zones. The population of these zones might decrease by as much as 700,000 over the COLUC Base condition. The bulk of this population would be attracted to the Eastern and Western Areas. It should be noted from Table 8 that the population shifts to any one sub-area are not likely to be as large as might be experienced under servicing policies directed to one specific sub-area.

The shifts in service employment that might be expected from the COLUC Base condition are also presented in Table 8.

2.4 REGIONAL TRANSPORT POLICIES

The land use model analyses described previously are based on the expected 1986 regional highway system properties which are referred to in this report as the 1986 basic road times. Eight separate transport policies have been postulated and seven of these represent rapid transit options while one option postulates the completion of the Scarborough Expressway.

With the aggregated Lowry model analyses conducted population and service employment are allocated on the basis of the minimum travel times between zones independently of whether these travel times are by

road or public transport. While the characteristics of the public transport system may influence the distribution of population and service employment at the micro-zone scale, there is little or no evidence to indicate that the quality of public transport services has an influence on population distribution at the scale of the COLUC studies. If analyses disaggregated by socio-economic group were being conducted then the quality of the public transport service is a significant factor in the location decisions of the lower income groups.

If the proposed public transport alternatives have inter-zonal travel times superior to the base road network then these improved accessibilities will be reflected in changes in Lowry model allocations of population and service employment. Appendix D illustrates the key characteristics of the transport policy proposals relative to the base road and transit networks for those zone pairs influenced by the proposals.

Inspection of the zone-pair travel times summarized in Appendix D indicates that none of the proposed policy changes have travel times that are less than the 1986 base road network times. Consequently, the transport policies listed in Appendix D will have no impact on the urban place population totals.

In order to provide an appreciation of the impact that the transit policies might have on those groups whose location decisions are sensitive to transit service a number of Lowry model analyses were executed using the transit skim trees. Figure 8 shows the population allocations to urban places using transport policy 4a versus the allocations using the base transit network. Transport policy 4a postulates a high speed rapid transit line along the lakeshore between Hamilton and Oshawa. Under this

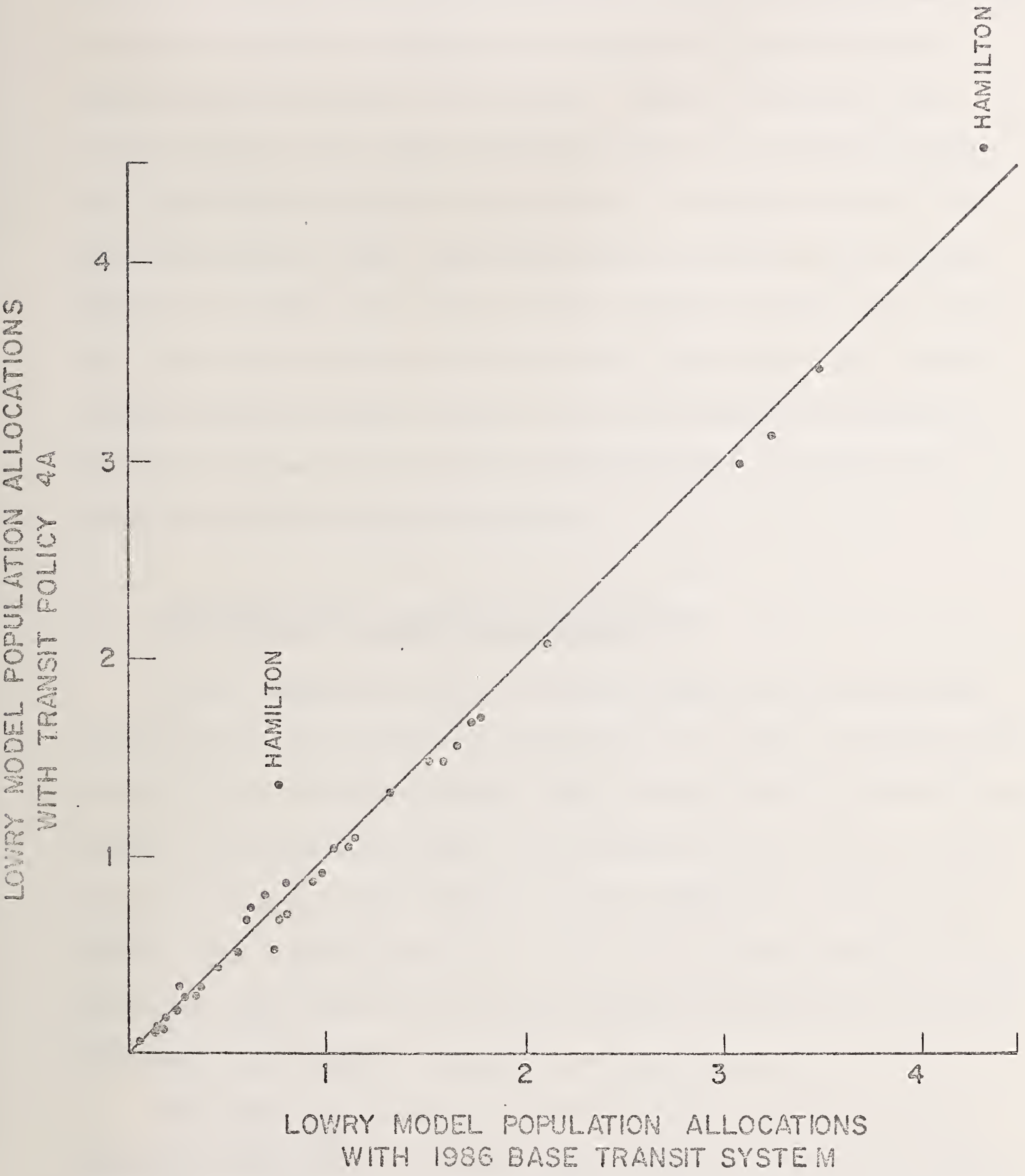


FIGURE 8 - LOWRY MODEL POPULATION ALLOCATIONS FOR TWO TRANSPORT POLICY OPTIONS

policy the transit travel time between the Toronto CBD and Oshawa would be reduced from 92 to 63 minutes and between the Toronto CBD and Hamilton from 115 minutes to 67 minutes. Figure 8 shows that the changes over the base transit condition likely to be induced by this high speed line are marginal except for the two Hamilton zones. Under transport policy 4a these zones become very accessible to the Toronto CBD but the transit travel time is still greater than the travel time by car. Lowry model analyses performed using some of the other transit policies exhibited similar traits in that the population allocated to the one or two zones receiving the improved transit service relative to the base condition increased marginally.

2.5 CONCLUSIONS WITH RESPECT TO 1986 ANALYSES

It was suggested in Part 1 that the objective of the land use model analyses of the COLUC structure plan is to assist in the identification of a set of public policies that will most likely guide development towards the preferred end state. The elements of such a public policy were identified as a distribution of basic employment, a set of residential trunk servicing policies, a set of urban place population sizes and market areas that will yield the preferred distribution of service employment and a regional transport servicing policy.

The Lowry model analyses of the COLUC Base condition produced population allocations to the five COLUC sub-areas which are in fairly general agreement with the 1986 COLUC population preferences. The population allocations to the Metropolitan Toronto zones are essentially equal. The Lowry model allocations are about 20 percent higher for the

Eastern sub-area, 10 percent higher for the Western sub-area, 15 percent higher for the Hamilton sub-area and about 50 percent lower for the Northern sub-area.

Population and employment allocations to COLUC sub-areas by the Lowry and Empiric models, and by the Murray V. Jones/Peat Marwick and Partners (MVJ/PMP) study are fairly consistent. The closest agreement is between the Lowry and MVJ/PMP population and employment allocations with the exception of the Eastern sub-area. However, it is interesting to note that both the Lowry and Empiric models predicted a population for the Eastern sub-area of about 120,000 higher than the MVJ/PMP allocations. The Empiric model predicted a higher population for the Northern sub-area than both of the other studies.

A review of the population allocations on a zone by zone basis indicated that the population holding capacities tended to be exceeded in the zones in the western part of Toronto and in the Mississauga zones. Oshawa-Whitby had the largest over-allocation of population for the distribution of basic employment estimated for 1986.

The Lowry tended to allocate greater employment in the population growth areas than Empiric or the MVJ/PMP study. This is a reflection of the way in which the Lowry model allocates population serving employment without lag.

The corridor travel demand analysis indicated that the heaviest work-home travel demands might be along the highway 401 corridor in the northwestern sector of Metropolitan Toronto and along the lakeshore corridor between the Toronto CBD and Mississauga. The implications of these corridor travel demands would have to be examined in terms of the facilities within critical corridor cross-sections.

The removal of the employment of the proposed North Toronto International Airport and its concentration at the present Malton site had little impact on population distribution at the regional scale. The shifting of 15,000 employees is equivalent to about 32,000 persons. As would be expected, the principal residential zones influenced are those on the edges of Metropolitan Toronto and those within the Eastern and Western sub-areas adjacent to the two airport sites.

The residential land servicing policies had the largest influence on the distribution of population and employment within the COLUC Region. Of the individual servicing policies tested the Peel Pipe had the largest impact on the population of Metropolitan Toronto as well as the largest impact on the population in any one COLUC sub-area relative to the Base condition. This would be expected since the COLUC Base concept analysis showed that the zones to the west of Toronto are likely to experience higher demand and the provision of serviced land simply strengthened this demand. This policy also had the effect of making Mississauga an important service employment centre which in turn created an additional demand for residential location within the Western Sub-Area by the service employees. Similar effects were produced by the other servicing policies in that population was directed to the areas influenced by the particular servicing policy along with a shift in population-serving employment. For the case in which all of the servicing policies were combined, the model allocations suggested a large decentralizing effect on the population of Metropolitan Toronto.

The regional transport policy alternatives tested all represented improvements in the public transport system with the exception of the

Scarborough Expressway alternative. For the aggregated types of analyses conducted in the investigations described in this report, population and employment are allocated to zones in terms of the minimum travel times between zones irrespective of whether the times are by road or transit. None of the public transport policies postulated had inter-zonal travel times less than the base road network and consequently are likely to have little impact on the broad regional allocations of population and employment. If land use model analyses disaggregated by economic group were being conducted then the quality of the public transport service is likely to have a significant impact on the location decision of certain groups.

3. 2001 HORIZON YEAR ANALYSES

3.1 COLUC BASE CONDITION

Table 9 summarizes the 2001 residential holding capacities for each zone along with the basic employment distribution. The model was run using the 1986 inter-zonal road travel times and the same behavioural parameters used for the 1986 analyses.

3.1.1 Population and Employment Allocations

The population and service employment allocations calculated by the model for each zone are presented in Appendix C. The population allocations to each of the five COLUC sub-areas are presented in Table 10 while Table 11 summarizes the employment allocations to the sub-areas.

Table 10 indicates that the model-allocated populations to sub-areas are in general agreement with the 2001 population preferences. The largest percentage difference in population is in the Northern sub-area where the model allocated population is about 25 percent less than the population preference. The model-allocated populations to each of the other sub-areas are all greater than the population preferences. However, it should be noted that the total population allocated by the model is about 290,000 greater than the total population preference.

Table 11 shows that there are significant differences between the model-allocated employment totals by sub-area and the 2001 employment preferences. The total employment allocated by the model is about 420,000 greater than the total of the employment preferences and this difference accounts for a significant amount of the employment variations

TABLE 9 - COLUC BASE RESIDENTIAL HOLDING CAPACITIES AND BASIC EMPLOYMENT FOR 2001

ZONE NO.	BASIC EMPLOYMENT	HOLDING CAPACITY	ZONE NO.	BASIC EMPLOYMENT	HOLDING CAPACITY
1	126,000	86,000	26	7,000	51,000
2	107,000	274,000	27	0	0
3	22,000	302,000	28	10,000	80,000
4	96,000	158,000	29	5,000	35,000
5	42,000	120,000	30	6,000	40,000
6	43,000	149,000	31	3,000	27,000
7	27,000	170,000	32	0	0
8	36,000	68,000	33	0	0
9	80,000	130,000	34	0	0
10	60,000	118,000	35	30,000	30,000
11	10,000	110,000	36	28,000	150,000
12	15,000	145,000	37	27,000	186,000
13	31,000	128,000	38	59,000	360,000
14	46,000	172,000	39	11,000	75,000
15	34,000	195,000	40	16,000	90,000
16	46,000	215,000	41	18,000	90,000
17	8,000	62,000	42	3,000	11,000
18	9,000	88,000	43	10,000	45,000
19	13,000	60,000	44	0	0
20	74,000	280,000	45	0	0
21	18,000	80,000	46	25,000	120,000
22	0	0	47	8,000	40,000
23	25,000	135,000	48	116,000	340,000
24	35,000	120,000	49	25,000	100,000
25	0	0	TOTAL	1,410,000	5,235,000

TABLE 10 - COLUC BASE SUB-AREA POPULATION ALLOCATIONS 2001

SUB-AREA	1971 POPULATION	2001 MODEL ALLOCATED	2001 PREFERENCES	MODEL-PREFERENCES
Metro Toronto	2,100,000	2,875,743	2,750,000	125,743[1]
Eastern Area	172,000	714,033	690,000	24,033
Northern Area	98,000	171,008	233,000	-61,992[2]
Western Area	372,000	1,097,377	962,000	135,377
Hamilton Area	374,000	662,806	600,000	62,806
TOTAL		5,520,967	5,235,000	285,967

[1] population over-allocation by model

[2] population under-allocation by model

TABLE 11 - COLUC BASE SUB-AREA EMPLOYMENT ALLOCATIONS 2001

SUB-AREA	2001 MODEL ALLOCATED	2001 PREFERENCES*	MODEL-PREFERENCES
Metro Toronto	1,277,964	1,300,000	- 22,036
Eastern Area	375,221	226,700	148,521
Northern Area	40,618	53,600	-12,982
Western Area	590,396	303,700	286,696
Hamilton Area	326,612	257,000	69,612
TOTAL	2,610,811	2,191,000	419,811

* From M.T.C. estimates in Table 5 of "The Preferred Phasing of Population and Employment Allocations in COLUC", Woods, Gordon & Co., April, 1974.

in the sub-areas. The model-allocated employments are significantly higher than the employment preferences in the Eastern, Western and Hamilton areas. Part of the differences in the Western and Hamilton areas is due to the higher populations allocated to these areas by the model.

3.1.2 Comparison With Other Studies

Table 12 shows the population and employment allocated to each of the five COLUC Sub-Areas by three studies. This table shows that the populations allocated to the Metro area are very similar in each of the three studies. The employment allocated to the Metro area by the Lowry and MVH/PMP studies is very similar with Empiric allocating some 200,000-300,000 more jobs to the Metro area. Both the Lowry and Empiric analyses allocated more population to the Eastern area than the MVJ/PMP study with the Lowry allocating a significantly higher employment to this area. This is a reflection of a basic assumption of the Lowry model which is that the population-serving employment will follow population with very little lag. The other entries in Table 12 indicate close agreement between the population and employment allocations to sub-areas provided by the Lowry and MVJ/PMP analyses. It should be noted from Table 12 that there is a significant difference in the Empiric-allocated employment to Hamilton and the other two allocations. The Empiric allocations of employment reflect a significant lag of employment decentralization after shifts in population have occurred.

Figure 9 shows the Lowry model population allocations to urban places plotted against the MVJ/PMP population allocations for 2001. At

TABLE 12 - COMPARISON OF COLUC SUB-AREA POPULATION AND EMPLOYMENT ALLOCATIONS 2001

	STUDY	COLUC SUB-AREA				
		METRO	EASTERN	NORTHERN	WESTERN	HAMILTON
POPULATION	LOWRY	2,876,000	714,000	171,000	1,097,000	663,000
	EMPIRIC	2,908,000	688,000	229,000	872,000	744,000
	MVJ/PMP	2,740,000	590,000	185,000	1,017,000	595,000
EMPLOYMENT	LOWRY	1,278,000	375,000	41,000	590,000	327,000
	EMPIRIC	1,579,000	287,000	161,000	409,000	159,000
	MVJ/PMP	1,370,000	276,000	79,000	489,000	335,000

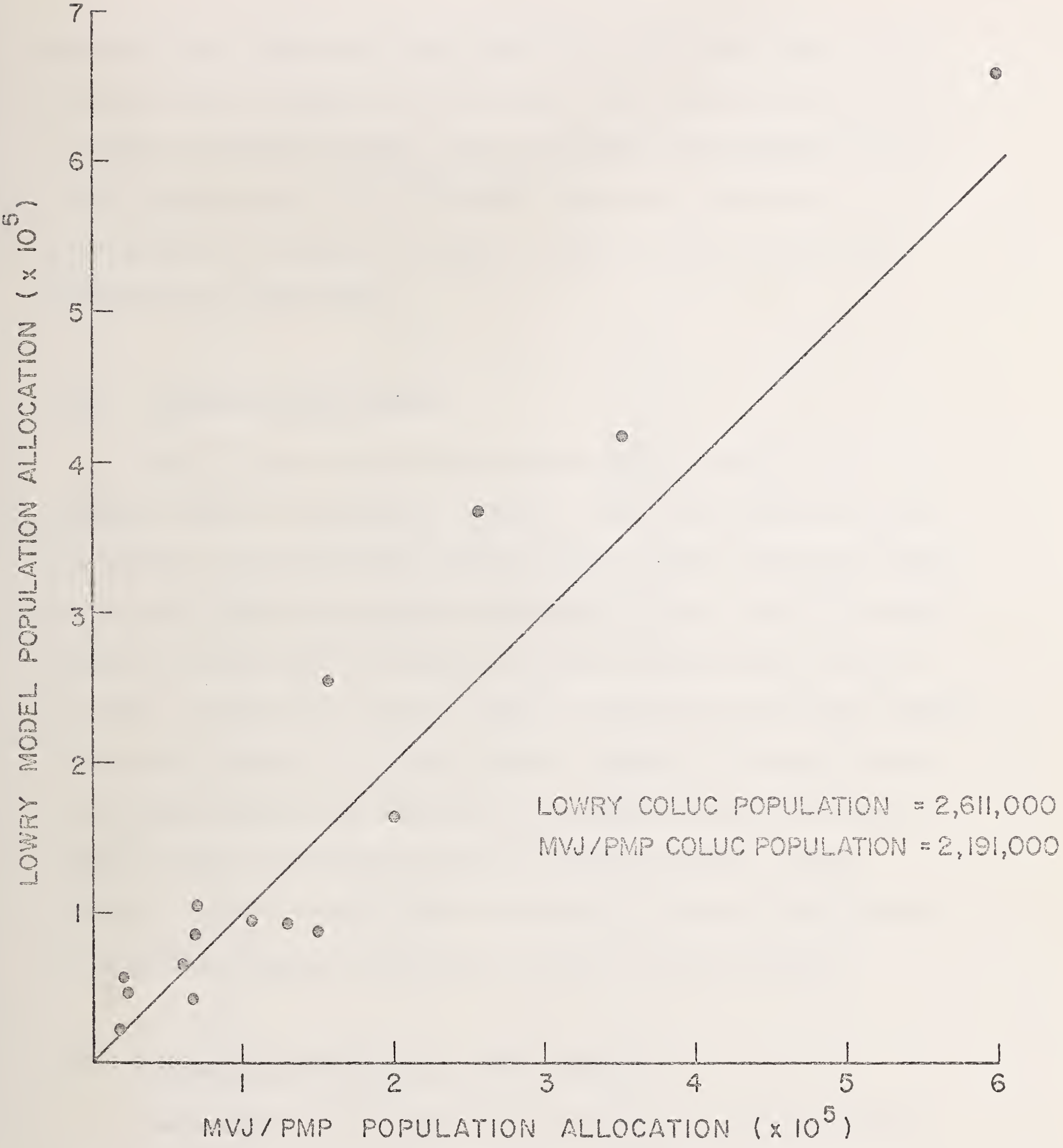


FIGURE 9 - LOWRY MODEL vs MVJ / PMP POPULATION ALLOCATIONS 2001

the individual urban place level significant differences exist between the allocations to Hamilton, Mississauga, Oshawa-Whitby and Erin Mills. It should be recalled, however, that relatively chose agreement exists at the sub-area level. The difference between the allocations is due principally to the decentralization in population-serving employment forecast by the Lowry model.

3.1.3 Corridor Travel Demands

Table 13 shows the corridor travel demands assigned to the skeletal network illustrated in Figure 7. The travel demands used for the analysis are derived from 2001 Coluc Base concept studies performed by the North Pickering Community Development Project. The link volumes shown in this Table may be compared with the volumes shown in Table 5 in order to explore the probable changes in corridor level travel demands between 1986 and 2001. The most dramatic changes in corridor volumes are on those links in the vicinity of the eastern boundary of Metropolitan Toronto and along the eastern lakeshore corridor. These estimated corridor volumes should be reviewed in terms of the existing and committed transport facilities in these critical corridors.

3.2 Conclusions With Respect to 2001 Analyses

The analyses of the COLUC Base condition for the 2001 horizon year suggest that the broad population and employment distribution preferences are internally consistent and compatible with the accessibility properties postulated for the Region. There are some significant

TABLE 13 - CORRIDOR NETWORK ASSIGNMENT VOLUMES
WORK-HOME TRIPS 2001

LINK NUMBER	2-WAY VOLUMES	LINK NUMBER	2-WAY VOLUMES
200-201	46,065	218-229	7,664
201-204	22,426	220-221	130,822
202-203	43,987	221-222	112,337
203-204	13,782	221-229	17,601
204-205	35,911	222-223	38,408
204-207	179	223-224	56,053
205-206	20,704	223-227	25,239
206-208	16,019	223-231	21,835
207-209	4,134	224-225	51,557
208-209	1,842	224-232	796
208-210	14,843	225-228	60,047
209-216	9,538	225-234	44,468
210-211	80,352	226-227	81,273
211-212	73,414	227-228	23,558
211-226	28,452	229-230	12,950
212-216	24,640	230-231	14,419
212-219	645	231-232	25,787
212-220	116,722	232-233	16,060
213-214	6,835	233-234	30,132
214-215	10,061	233-237	10,593
214-216	3,178	233-239	55,986
215-217	5,044	234-235	27,087
215-216	39,258	235-236	37,032
217-218	8,244	236-238	4,423
217-219	645		

differences between the sub-area employment preferences and the model-allocated employment levels. Some of these differences are due to the higher employment total used in the Lowry model analyses.

The sub-area population and employment allocations estimated in three parallel studies of the COLUC Region are generally consistent. The principal differences between the studies are the high population and employment allocations to the Eastern sub-area by the Lowry model analyses and the very low employment allocated to Hamilton by Empiric.

The corridor-level travel demand analysis indicates that there is likely to be large changes in the travel demands on the eastern fringes of Metropolitan Toronto and along the eastern lakeshore corridor.

4. 1986 URBAN PLACE SERVICE HIERARCHY ANALYSIS

Earlier in this report it has been pointed out that a fundamental principle of the preferred COLUC urban structure plan is a particular distribution of population-serving employment and urban place orientations with respect to the service employment. Six urban place functional classes have been identified and ideal ranges of service area populations have been postulated.

The analyses described previously in this report allocated population-serving employment in terms of one sector aggregated over all service employment types. This aggregated allocation of service employment tends to over-allocate service employment to the larger urban places at the expense of the smaller places. This section of the report describes certain land use model analyses which are based on service employment allocations disaggregated by sector. This analysis is based on labour force data collected in the 1971 census. Employment data are not yet available.

4.1 Service Employment Demand Rates

The analyses described earlier in this report used an aggregated population-serving employment demand rate of 0.19 service employees per capita. The type of disaggregation of the service employment sector used was constrained by the census labour force classifications. The following classifications were used along with the demand rates indicated.

1. Retail employment = 0.07 employees/person (0.05)
2. Personal services employment = 0.02 employees/person (0.01)

3. Educational employment = 0.03 employees/person (0.03)
4. Health/welfare employment = 0.03 employees/person (0.03)
5. Finance, real estate employment = 0.02 employees/person (0.02)
6. Public administration employment = 0.02 employees/person (0.02).

The rates shown in parenthesis are the average rates obtained from an analysis of the 1971 labour force data. The retail services and personal services employment rates have been increased to the magnitudes shown in order that the sum over the six sectors equals 0.19 employees per capita.

The same transport behavioural parameters were used for each of these service sectors as used for the aggregate analyses described previously. While there may be some justification for using different transport behavioural parameters for the various sectors appropriate information was not available.

4.2 COLUC Base Analysis

The information used for the analysis described in this Section is identical with that used in the analyses described in Section 2.1 of this report with the exception of the disaggregation of the service employment described in Section 4.1.

Table 14 shows the population and total service employment allocated to each urban place by the land use model. The per capita service employment ratio for each urban place is also shown in the table. It should be recalled that the COLUC Region average is 0.19 service employees per capita and variations from this average may be used as an indicator of the relative importance of each urban place as a service centre.

TABLE 14 - MODEL ALLOCATED POPULATIONS AND SERVICE EMPLOYMENTS 1986

ZONE NO.	POPULATION	SERVICE EMP.	EMP/CAPITA	ZONE NO.	POPULATION	SERVICE EMP.	EMP/CAPITA
1	89,278	16,552	0.19	26	23,277	3,877	0.17
2	245,756	31,553	0.13	27	0	0	-
3	263,061	39,089	0.15	28	37,905	5,575	0.15
4	156,439	22,543	0.14	29	14,058	2,135	0.15
5	120,187	21,126	0.18	30	14,038	2,074	0.15
6	143,711	22,011	0.15	31	6,179	701	0.11
7	163,534	31,626	0.19	32	0	0	-
8	72,594	12,323	0.17	33	0	0	-
9	131,299	21,306	0.16	34	0	0	-
10	106,613	16,379	0.15	35	21,612	5,734	0.26
11	93,650	14,999	0.16	36	93,841	27,402	0.29
12	144,094	31,321	0.22	37	67,531	26,696	0.40
13	132,505	32,761	0.25	38	241,885	54,325	0.22
14	180,083	31,475	0.17	39	10,741	1,279	0.12
15	174,392	29,380	0.17	40	72,502	17,257	0.24
16	172,671	28,194	0.16	41	60,363	11,377	0.19
17	46,261	8,809	0.19	42	8,405	1,314	0.16
18	68,537	12,536	0.18	43	18,629	2,706	0.15
19	39,860	6,513	0.16	44	0	0	-
20	258,905	64,306	0.25	45	0	0	-
21	38,836	7,697	0.20	46	67,047	11,277	0.17
22	0	0	-	47	19,051	2,836	0.15
23	57,738	11,554	0.20	48	323,041	71,832	0.22
24	20,828	3,643	0.17	49	43,701	6,352	0.15
25	0	0	-	TOTAL	4,065,398	772,426	0.19

The entries in Table 14 indicate that all of the zones within Metropolitan Toronto (1-19) have ratios equal to or less than the region average with the exception of zones 12 and 13. Zone 12 is on the northern boundary of Metropolitan Toronto while zone 13 is in the southwest corner of Toronto and both zones are marginally more attractive service centres than the surrounding zones.

The other zones with higher than average ratios are Oshawa (20), Malton (35), Brampton-Bramalea (36), Erin Mills (37), Mississauga (38), Burlington (40) and Hamilton (48). These zones represent the focal points for service employment within the Region outside of Metropolitan Toronto with Oshawa, Brampton-Bramalea and Erin Mills being indicated as the locations of the major service employment focii. It is interesting to note from Table 14 that the zones in the Northern sub-area and the second tier urban places in the eastern and western sub-areas have less than average per capita service employment ratios.

Table 15 provides a breakdown of the per capita service employment rates by service sector for each of the urban places. The entries in this table indicate that the principal source of variation in the aggregate service employment rate is the variation in the per capita retail service employment rate. The model allocations of retail employment favour the urban places within each sub-area of the COLUC Region which are most easily accessible to the population of the sub-region. For example, the per capita retail employment rate in Oshawa (20) is 0.108 while the rates for Ajax (21), Pickering (23) and North Pickering (24) are only 0.064, 0.056 and 0.039, respectively. The entries in Table 15 indicate that the service employment in the other sectors tends to be

TABLE 15 - MODEL ALLOCATED SERVICE EMPLOYMENTS PER CAPITA FOR VARIOUS SERVICE TYPES

ZONE NO.	SERVICE EMP/CAPITA FOR TYPE					
	1	2	3	4	5	6
1	0.105	0.019	0.028	same as for type 3 since per capita rate is same	same as type 2	same as type 2
2	0.026	0.017	0.026			
3	0.039	0.018	0.027			
4	0.038	0.018	0.026			
5	0.063	0.019	0.028			
6	0.046	0.018	0.027			
7	0.079	0.019	0.029			
8	0.062	0.018	0.027			
9	0.052	0.018	0.028			
10	0.044	0.018	0.028			
11	0.050	0.019	0.028			
12	0.013	0.102	0.029			
13	0.126	0.020	0.030			
14	0.062	0.019	0.028			
15	0.055	0.019	0.028			
16	0.047	0.019	0.029			
17	0.066	0.021	0.031			
18	0.064	0.020	0.030			
19	0.046	0.020	0.029			
20	0.108	0.023	0.035			
21	0.064	0.022	0.034			
22	-	-	-			
23	0.056	0.010	0.036			
24	0.039	0.023	0.034			
25	-	-	-			
26	0.046	0.020	0.030	same as type 3	same as type 2	same as type 2
27	-	-	-			
28	0.029	0.020	0.030			
29	0.178	0.022	0.034			
30	0.145	0.022	0.034			
31	0.009	0.018	0.026			
32	-	-	-			
33	-	-	-			
34	-	-	-			
35	0.138	0.021	0.032			
36	0.134	0.026	0.040			
37	0.252	0.024	0.036			
38	0.096	0.022	0.032			
39	0.005	0.019	0.029			
40	0.098	0.025	0.037			
41	0.056	0.022	0.034			
42	0.038	0.020	0.030			
43	0.024	0.021	0.032			
44	-	-	-			
45	-	-	-			
46	0.039	0.021	0.031			
47	0.034	0.020	0.031			
48	0.089	0.021	0.032			
49	0.022	0.020	0.029			
AVERAGE	0.07	0.02	0.03	0.03	0.02	0.02

allocated fairly uniformly across all urban places. This type of behaviour of service employment has been observed in the preliminary analyses of the 1971 census labour force data. The per capita retail employment ratio increased with increasing city size for urban areas within the population range of 10,000 to 200,000. In contrast, the per capita service employment ratios were essentially constant for such sectors as personal services, finance and real estate and education.

The principal effect produced by the land use model analysis with the disaggregated service employment sub-model is to reduce the service employment allocated to certain of the larger urban places which in turn reduces the population allocated to those urban places.

The urban place service employment linkages are calculated by the model for each service employment type and the service areas of any urban place may be calculated. Summaries of these linkages are not provided in this report but are available in the computer output.

The land use model analyses as well as the preliminary analyses of the 1971 census data indicate that the notions of urban place functional class contained in the COLUC Mature State concept are not realistic, except to a limited extent for the retail employment sector. A much more comprehensive analysis of the service employment distributions within the COLUC Region is required.

5. COLUC DEVELOPMENT POLICY IMPLICATIONS OF ANALYSES

The principal objective of conducting land use model analyses of regional development structure plans is to assist planners in isolating a consistent set of public development policies that are most likely to yield the preferred distribution of population and employment. The Lowry-family of land use models is able to assist in the development of a public policy set consisting of the following components:

1. A distribution of basic employment throughout a region with those components of basic employment whose location may be influenced directly by government policy being identified clearly.
2. A set of residential trunk servicing policies along with the target population densities for each zone.
3. A set of urban place population sizes along and inter-urban place transport accessibilities that will yield the preferred distributions of service employment by sector.
4. A set of region wide transport policies that are fully supportive of the other public policy elements.

The basic employment distribution specified for the 1986 COLUC Base condition along with the associated trunk servicing, housing density and transport system policies can be expected to yield in broad terms the 1986 population preferences. The model population allocations suggest that housing demand pressures may be expected to be high in the western fringes of Metropolitan Toronto as well as in the Mississauga, Erin Mills and Brampton-Bramalea areas. The model-allocated populations

are due to the decentralization of population-serving employment estimated by the model. The model analyses of the COLUC Base condition indicated that the maximum work-home transport demands may be expected along the Highway No. 401 corridor. Two-way work-home demands in excess of 100,000 trips per day are indicated along this corridor. It seems clear that any further dimensioning of the COLUC structure plan should be accompanied by objective transport demand analyses in the critical corridors of the Region.

While only 19,000 employees are expected at the proposed North Toronto International Airport in 1986 the cancellation of this project can be expected to increase further the demand for housing in western urban places mentioned previously. The shifting of this employment to Malton is equivalent to moving about 32,000 persons from the eastern part of the COLUC Region. However, the marginal impact of this employment shift on any one urban place would be small.

In the analyses described in this report population-serving employment represented about 40 percent of the total employment. Consequently, development policies which have an influence on the spatial distribution of population also exert tremendous leverage on a significant amount of the employment. Four trunk servicing policies have been tested and these policies have been shown to have an important impact on the distribution of population within the COLUC Region.

The trunk servicing policy which accelerated the provision of serviced residential land to the Peel region had the largest differential impact on population distribution of the individual servicing policies tested. If this servicing policy were pursued then it could be expected to result in a differential shift of about 500,000 people to Mississauga,

Erin Mills and Brampton-Bramalea by 1986. A population shift of this magnitude would create a large service centre in the Mississauga area. This servicing policy would no doubt destroy one fundamental principle of the COLUC structure plan concept which is to have separate service sub-systems focussed on both Mississauga and Hamilton. While corridor traffic assignment analyses were not performed for this development policy it is clear that very large investments in transport infrastructure would be required to serve the transport demands created by this policy.

The trunk servicing policy which would accelerate the provision of serviced residential land in the York region area may be expected to have the least differential impact on population distribution within the COLUC Region. This servicing policy would stimulate the growth of population in the Northern and Eastern sub-areas along with service employment. However, the model allocations of service employment indicate that this area would be in the service area shadow of Metropolitan Toronto. Unless parallel steps were taken to improve the employment base in this area then commuting from these areas can be higher than under the other servicing policies.

The trunk servicing policy directed towards the Oshawa area may be expected to accelerate the population growth in this area of the COLUC Region and to reinforce Oshawa as the dominant service employment centre in this part of the COLUC Region. A trunk servicing policy of this type would help to achieve one of the basic principles of the COLUC structure plan concept which is to have Oshawa at the focus for the service sub-systems in the eastern part of the COLUC Region.

The regional transport policies postulated for the Region are unlikely to have major impacts on the distribution of population and employment at the regional scale. Travel times on the 1986 base road network are expected to be uniformly better than any of the postulated public transport alternatives except for a few zone pairs.

The limited service employment analysis of the 1986 COLUC Base condition would suggest that serious deviations from the preferred service employment distributions might occur if careful attention is not directed towards the proper scaling and articulation of the urban places. In fact, the service employment analysis conducted would suggest that the urban place functional class hierarchy postulated for the COLUC Mature State structure plan is probably not a realistic concept.

REFERENCES

1. COLUC TASK FORCE, "Definition of the Mature State Plan", January, 1974.

APPENDIX A - DESCRIPTION OF LAND USE MODEL EQUATIONS

The land use-transport demand model used in the analyses described in the main body of the report is based on the Lowry model. The model consists of three sub-models which are the residential sub-model, the service sub-model and a linking sub-model.

The residential sub-model allocates employees of socio-economic group k working in employment zone i to residential opportunities in zone j that are compatible with the preferences and ability to pay of this group. The residential sub-model produces an n x n square matrix which shows the households in zone j that are occupied by employees living in zone i for each of the k socio-economic groups. The entries in this matrix are calculated from:

$$\ell_{ij}^{km} = e_i^k a^k pr^{km} [h_j^k \exp(-\alpha_i d_{ij}^k) / \sum_j h_j^k \exp(-\alpha_i d_{ij}^k)] \qquad (A.1)$$

where ℓ_{ij}^{km} = the number of zone i employees of socio-economic group k, who live in zone j and travel there by mode m

e_i^k = the total number of employees of socio-economic group k who work in zone i

a^k = the inverse of the labour participation rate for socio-economic group k in terms of households per employee (or population per employee)

pr^{km} = the probability that socio-economic group k will choose mode m for the journey to work

h_j^k = the number of residential opportunities in zone j that are compatible with socio-economic group k

α_i = the work-zone i specific parameter which reflects the influence that travel time d_{ij} has on residential location selection where α is established by calibration of the residential sub-model

d_{ij}^k = the travel time between zones i and j on the mode of transport that is most important to socio-economic group k in the selection of a household location.

The number of households of socio-economic group k allocated to each zone are calculated by summing the columns of the linkage matrix calculated by equation (A.1):

$$p_j^{km} = \sum_i \ell_{ij}^{km} \tag{A.2}$$

where p_j^{km} = the number of households allocated to zone j which are occupied by group k employees travelling by mode m

$$p_j^k = \sum_m p_j^{km} \tag{A.3}$$

where p_j^k = the number of households allocated to zone j which are occupied by group k employees.

The allocation of households to zones calculated by equations (A.1), (A.2) and (A.3) are subject to the following constraints:

$$p_j^k \leq p_j^{ck} \tag{A.4}$$

where p_j^{ck} = the residential holding capacity of zone j for each socio-economic group k.

The service sub-model allocates the demand for r-types of household serving employment to competing service centre locations using the following equation:

$$\ell_{ij}^{rkm} = p_j^k b^{kr} pr^{km} [s_i^r \exp(-\beta^r d_{ij}^k) / \sum_i s_i^r \exp(-\beta^r d_{ij}^k)] \tag{A.5}$$

where ℓ_{ij}^{rkm} = the number of population-serving employees of type r in zone i serving households of socio-economic group k in zone j where the trip is by mode m

p_j^k = the number of households of group k allocated to zone j by the residential sub-model

b^{kr} = the type r population-serving employment per household generated by households in socio-economic group

pr^{kmr} = the probability that group k households will choose mode m for type r service trips

s_i^r = the attractivity of zone i for type r service trips.

The type r service employment allocated to each zone is obtained from:

$$e_i^{sr} = \sum_j \sum_k \sum_m \ell_{ij}^{rkm} \qquad \text{(A.6)}$$

Allocations of population-serving employments to zones produced by equations (A.5) and (A.6) must satisfy the following constraint equation:

$$e_i^{sr} \geq e_i^{srmin} \qquad \text{(A.7)}$$

where c_i^{srmin} = the population-serving employment thresholds for type r service employment that are considered to be viable for any one zone.

If the constraint equations (A.4) and (A.7) are violated by an activity allocation then new attractivity factors must be developed for the residential and service sub-models. The approach used in this model is:

$$h_j^{k*2} = h_j(h_j^{k*1}/p_j^k) \qquad \text{(A.8)}$$

where h_j^{k*2} = the new residential attractivity of zone j for the next run of the model

h_j^{k*1} = the residential attractivity of zone j in the previous iteration of the residential sub-model; $h_j^{k*1} = h_j$ for the second iteration of the sub-model

p_j^k = the households of group k allocated to zone j in each iteration of the sub-model.

$$\begin{aligned} s_i^{r*} &= s_i^r \quad \text{for zones in which} \quad e_i^{sr} \geq e^{srmin} \\ &= 0 \quad \text{for zones in which} \quad e_i^{sr} \leq e^{srmin} \end{aligned} \qquad \text{(A.9)}$$

Equations (A.1) to (A.9) are solved by an iterative process. The distribution of basic employment by zone along with an assumed distribution of population-serving employment by zone is used to produce the initial distribution of total employment by zone required by equation (A.1). The version of the model used can also accept the distribution of basic employment as the initial estimate of total employment. The linking sub-model simply performs the following calculation:

$$e_i^k = e_i^{bk} + e_i^{sk} \qquad (A.10)$$

Equation (A.10) calculates a distribution of total employment from the exogenously specified basic employment vector and the model-allocated population-serving employment distribution. A stable co-distribution of population and employment is obtained when the total employment distribution used at the beginning of an iteration of the model is equal to the distribution of total employment calculated at the end of the iteration.

The model analyses described in the report were aggregated over both socio-economic groups and over population-serving employment types.

The travel demand matrices for a model-allocated co-distribution of population and employment are calculated by multiplying the work and service linkage matrices defined in equations (A.1) and (A.5) by the appropriate trip rates:

$$T^{wkm} = W^k[\ell_{ij}^{km}] \qquad (A.11)$$

$$T^{rkm} = R^k[\ell_{ij}^{rkm}] \qquad (A.12)$$

where T^{wkm} = n x n square matrix of t_{ij}^{wkm} the number of trips by group k employees from jobs in zone i to households in zone j by mode m

W^{k} = n x n diagonal matrix of the work trip generation rates per employee for group k

T^{rkm} = n x n square matrix of t_{ij}^{rkm} the number of trips by group k households in zone j to type r service opportunities in zone i by mode m

R^{k} = n x n diagonal matrix of the type r service trip generation rates per household.

APPENDIX B - LAND USE MODEL PARAMETERS USED

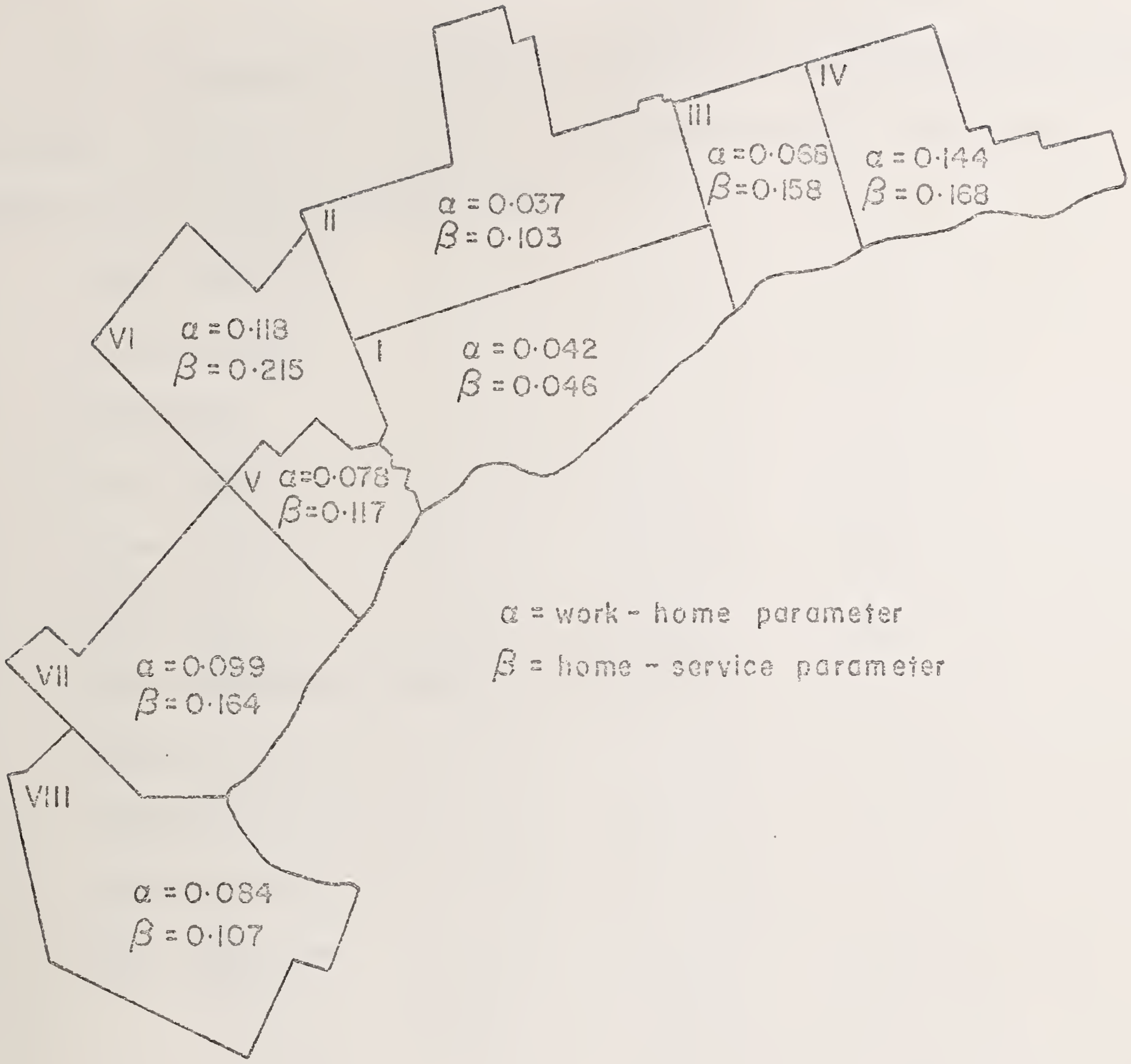
The land use model described in Appendix A requires the following parameter magnitudes when it is used for forecasting:

1. The inverse of the labour participation rate, a
2. The population-serving employment demand rate, b
3. The work-home travel time parameter by employment zone, α_i
4. The home-service travel time parameter by residential zone, β_j
5. The home-based work trip generation rate per employee, W
6. The home based service trip generation rate per capita, R.

The parameter magnitudes used in the analyses described in this report are:

1. a = 2.178 persons per employee
2. b = 0.191 service employees per person
3. the α magnitudes by district are shown in Figure B.1
4. the β magnitudes by district are shown in Figure B.1
5. W = 0.85 trips per employee
6. R = 0.47 trips per person

The α and β magnitudes shown in Figure B.1 were established from calibration to 1971 trip length frequency distributions provided by the T.A.R.M.S. project of the Ministry of Transportation and Communications Ontario. The individual zones associated with each calibration district are shown in Figure B.1.



DISTRICT	ASSOCIATED ZONES	DISTRICT	ASSOCIATED ZONES
I	1 – 19	V	37, 38
II	26 – 32	VI	33, 35, 36
III	23 – 25	VII	40 – 45
IV	20-22, 34, 39	VIII	46 – 49

FIGURE B·1 – BEHAVIOURAL PARAMETER MAGNITUDES USED FOR EACH CALIBRATION DISTRICT

APPENDIX C - MODEL OUTPUT SUMMARIES

The attached tables summarize the land use model population and employment allocations to each of the analysis zones. The summary sheets exist in the following order:

1. 1986 COLUC Base
2. No 2nd Airport
3. Peel Pipe
4. York Pipe
5. Oshawa Pipe
6. All Pipes
7. 1986 COLUC Base Transit
8. Transport Policy 4A
9. Transport Policy 4B
10. Transport Policy 6
11. 2001 COLUC Base

TABLE C.1 - POPULATION ALLOCATIONS: 1986 COLUC BASE

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	83350.	86000.	86000.00
2	270000.	230328.	270000.	270000.00
3	285000.	245684.	285000.	285000.00
4	158000.	152685.	158000.	158000.00
5	120000.	112900.	120000.	120000.00
6	145000.	134326.	145000.	145000.00
7	158000.	152219.	158000.	158000.00
8	68000.	70162.	68000.	68000.00
9	128000.	132388.	128000.	128000.00
10	112000.	102265.	112000.	112000.00
11	100000.	89331.	100000.	100000.00
12	132000.	136746.	132000.	132000.00
13	112000.	137562.	112000.	112000.00
14	169000.	184839.	169000.	169000.00
15	184000.	161022.	184000.	184000.00
16	195000.	158320.	195000.	195000.00
17	52000.	43060.	52000.	52000.00
18	74000.	63256.	74000.	74000.00
19	46000.	36819.	46000.	46000.00
20	194000.	316975.	194000.	194000.00
21	40000.	39010.	40000.	40000.00
22	0.	0.	0.	0.0
23	82000.	53443.	82000.	82000.00
24	30000.	19265.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	21395.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	35307.	50000.	50000.00
29	26000.	12647.	26000.	26000.00
30	29000.	12469.	29000.	29000.00
31	9000.	5935.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	23260.	18000.	18000.00
36	92000.	107478.	92000.	92000.00
37	54000.	75520.	54000.	54000.00
38	225000.	263936.	225000.	225000.00
39	15000.	11166.	15000.	15000.00
40	76000.	73930.	76000.	76000.00
41	66000.	62946.	66000.	66000.00
42	9000.	8835.	9000.	9000.00
43	24000.	18665.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	64336.	75000.	75000.00
47	20000.	19835.	20000.	20000.00
48	280000.	342152.	280000.	280000.00
49	50000.	44602.	50000.	50000.00
TOTALS	4086000.	4061453.	4086000.	4086000.00

TABLE C.2 - EMPLOYMENT ALLOCATIONS: 1986 COLUC BASE

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	136643.	16374.	17783.
2	101440.	152848.	112376.	51408.	10936.
3	17510.	71774.	38839.	54264.	21329.
4	92710.	122793.	104752.	30083.	12042.
5	37905.	60753.	57498.	22848.	19593.
6	38895.	66503.	53856.	27608.	14961.
7	23305.	53338.	60276.	30033.	36971.
8	30275.	43222.	41676.	12947.	11401.
9	58745.	83116.	74225.	24371.	15480.
10	44265.	65589.	54211.	21324.	9946.
11	7095.	26135.	17052.	19040.	9957.
12	11000.	36132.	58689.	25132.	47689.
13	22665.	43989.	76420.	21324.	53755.
14	33765.	65942.	61215.	32177.	27450.
15	25050.	60083.	47949.	35033.	22899.
16	33820.	70948.	51814.	37128.	17994.
17	5280.	15180.	13286.	9900.	8006.
18	6280.	20369.	17509.	14089.	11229.
19	9420.	18179.	13410.	8759.	3990.
20	59000.	95938.	146128.	36938.	87128.
21	7500.	15116.	13558.	7616.	6058.
22	0.	0.	0.	0.	0.
23	9300.	24913.	17010.	15613.	7710.
24	19000.	24712.	20664.	5712.	1664.
25	0.	0.	0.	0.	0.
26	6500.	11831.	8852.	5331.	2352.
27	0.	0.	0.	0.	0.
28	8400.	17920.	10291.	9520.	1891.
29	3000.	7950.	3331.	4950.	331.
30	5000.	10522.	5198.	5522.	198.
31	2400.	4114.	2458.	1714.	58.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	28513.	3472.	9813.
36	21300.	38816.	55283.	17516.	33983.
37	14000.	24381.	81443.	10381.	67443.
38	33700.	76673.	95696.	42973.	61996.
39	2950.	5806.	2992.	2856.	42.
40	9300.	23870.	28973.	14570.	19673.
41	12400.	24966.	19279.	12566.	6879.
42	2000.	3713.	2557.	1713.	557.
43	3000.	7570.	3666.	4570.	666.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	22290.	14280.	5290.
47	1500.	5408.	2657.	3908.	1157.
48	101000.	154312.	187038.	53312.	86038.
49	13000.	22520.	14404.	9520.	1404.
TOTALS	1088235.	1866680.	1863963.	778443.	775739

TABLE C.3 - POPULATION ALLOCATIONS: 1986 NO 2ND AIRPORT

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	83052.	86000.	86000.00
2	270000.	230364.	270000.	270000.00
3	285000.	244199.	285000.	285000.00
4	158000.	153921.	158000.	158000.00
5	120000.	112673.	120000.	120000.00
6	145000.	134272.	145000.	145000.00
7	158000.	151262.	158000.	158000.00
8	68000.	70551.	68000.	68000.00
9	128000.	134220.	128000.	128000.00
10	112000.	102547.	112000.	112000.00
11	100000.	88258.	100000.	100000.00
12	132000.	130441.	132000.	132000.00
13	112000.	139668.	112000.	112000.00
14	169000.	138195.	169000.	169000.00
15	184000.	159225.	184000.	184000.00
16	195000.	155415.	195000.	195000.00
17	52000.	41609.	52000.	52000.00
18	74000.	62159.	74000.	74000.00
19	46000.	36057.	46000.	46000.00
20	194000.	316950.	194000.	194000.00
21	40000.	37920.	40000.	40000.00
22	0.	0.	0.	0.0
23	82000.	50554.	82000.	82000.00
24	30000.	18048.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	20607.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	34983.	50000.	50000.00
29	26000.	12477.	26000.	26000.00
30	29000.	12279.	29000.	29000.00
31	9000.	5957.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	23907.	18000.	18000.00
36	92000.	110099.	92000.	92000.00
37	54000.	77458.	54000.	54000.00
38	225000.	259697.	225000.	225000.00
39	15000.	11019.	15000.	15000.00
40	75000.	73326.	75000.	75000.00
41	60000.	62416.	60000.	60000.00
42	9000.	9011.	9000.	9000.00
43	24000.	18065.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	68920.	75000.	75000.00
47	20000.	19304.	20000.	20000.00
48	230000.	342067.	230000.	230000.00
49	50000.	44509.	50000.	50000.00
TOTALS	4036000.	4061453.	4036000.	4036000.00

TABLE C.4 - EMPLOYMENT ALLOCATIONS: 1986 NO 2ND AIRPORT

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118850.	135234.	137111.	16384.	18261.
2	101440.	152848.	110374.	51408.	8934.
3	17510.	71774.	36443.	54264.	18933.
4	92710.	122793.	103315.	30083.	10605.
5	37905.	60753.	57494.	22848.	19589.
6	38895.	65503.	52942.	27608.	14047.
7	23305.	53388.	52030.	30083.	28725.
8	30275.	43222.	41736.	12947.	11461.
9	58745.	83116.	73555.	24371.	14810.
10	44265.	65589.	53394.	21324.	9129.
11	7095.	26135.	16393.	19040.	9298.
12	11000.	36132.	64081.	25132.	53081.
13	22665.	43989.	81841.	21324.	59176.
14	33765.	65942.	60964.	32177.	27199.
15	25050.	60083.	46847.	35033.	21797.
16	33820.	70948.	50010.	37128.	16190.
17	5280.	15160.	12436.	9880.	7156.
18	6280.	20369.	17139.	14089.	10859.
19	9420.	18179.	12925.	8759.	3505.
20	59000.	95938.	145752.	36938.	86752.
21	7500.	15116.	13059.	7616.	5559.
22	0.	0.	0.	0.	0.
23	9300.	24913.	15082.	15613.	5782.
24	4000.	24712.	8105.	20712.	4105.
25	0.	0.	0.	0.	0.
26	6500.	11831.	8457.	5331.	1957.
27	0.	0.	0.	0.	0.
28	8400.	17920.	9948.	9520.	1548.
29	3000.	7950.	3242.	4950.	242.
30	5000.	10522.	5133.	5522.	133.
31	2400.	4114.	2437.	1714.	37.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	33700.	22172.	33700.	-11528.	0.
36	21300.	38816.	55986.	17516.	34686.
37	14000.	24381.	35716.	10381.	21716.
38	33700.	76673.	94671.	42973.	60971.
39	2950.	5306.	2971.	2356.	21.
40	9300.	23870.	28763.	14570.	19463.
41	12400.	24966.	18157.	12566.	5757.
42	2000.	3713.	2445.	1713.	445.
43	3000.	7570.	3486.	4570.	486.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	21561.	14280.	4561.
47	1500.	5406.	2422.	3906.	922.
48	101000.	154312.	187818.	53312.	86818.
49	13000.	22520.	14012.	9520.	1012.
TOTALS	1038235.	1816680.	1813961.	778443.	775739.

TABLE C.5 - POPULATION ALLOCATIONS: 1986 PEEL PIPE

ZONE	GIVEN HHLDS	SIM- HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	67495.	86000.	86000.00
2	270000.	187514.	270000.	270000.00
3	285000.	198722.	285000.	285000.00
4	158000.	126706.	158000.	158000.00
5	120000.	90554.	120000.	120000.00
6	145000.	108349.	145000.	145000.00
7	158000.	122145.	158000.	158000.00
8	68000.	57296.	68000.	68000.00
9	128000.	109955.	128000.	128000.00
10	112000.	83266.	112000.	112000.00
11	100000.	71104.	100000.	100000.00
12	132000.	110278.	132000.	132000.00
13	112000.	116472.	112000.	112000.00
14	169000.	154461.	169000.	169000.00
15	184000.	129285.	184000.	184000.00
16	195000.	127425.	195000.	195000.00
17	52000.	35594.	52000.	52000.00
18	74000.	50916.	74000.	74000.00
19	46000.	29815.	46000.	46000.00
20	194000.	301019.	194000.	194000.00
21	40000.	35337.	40000.	40000.00
22	0.	0.	0.	0.0
23	82000.	44847.	82000.	82000.00
24	30000.	16211.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	17461.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	28576.	50000.	50000.00
29	26000.	10163.	26000.	26000.00
30	29000.	9975.	29000.	29000.00
31	9000.	4859.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	19854.	18000.	18000.00
36	275000.	285220.	275000.	275000.00
37	270000.	330094.	270000.	270000.00
38	440000.	445373.	440000.	440000.00
39	15000.	10247.	15000.	15000.00
40	76000.	58994.	76000.	76000.00
41	66000.	51898.	66000.	66000.00
42	9000.	7486.	9000.	9000.00
43	24000.	15100.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	53695.	75000.	75000.00
47	20000.	16523.	20000.	20000.00
48	280000.	294905.	280000.	280000.00
49	50000.	36865.	50000.	50000.00
TOTALS	4700000.	4061453.	4700000.	4700000.00

TABLE C.6 - EMPLOYMENT ALLOCATIONS: 1986 PEEL PIPE

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	128912.	16374.	10052.
2	101440.	152848.	106791.	51408.	5351.
3	17510.	71774.	29307.	54264.	11797.
4	92710.	122793.	100072.	30083.	7362.
5	37905.	60753.	48420.	22848.	10515.
6	38895.	66503.	46411.	27608.	7516.
7	23305.	53388.	43513.	30083.	20208.
8	30275.	43222.	36722.	12947.	6447.
9	58745.	83116.	69446.	24371.	10701.
10	44265.	65589.	49688.	21324.	5423.
11	7095.	26135.	12318.	19040.	5223.
12	11000.	36132.	38230.	25132.	27230.
13	22665.	43989.	78997.	21324.	56332.
14	33765.	65942.	54326.	32177.	20561.
15	25050.	60083.	37750.	35033.	12700.
16	33820.	70948.	44156.	37128.	10336.
17	5280.	15180.	10777.	9900.	5497.
18	6280.	20369.	12744.	14089.	6464.
19	9420.	18179.	11813.	8759.	2393.
20	59000.	95938.	139894.	36938.	80894.
21	7500.	15116.	12888.	7616.	5388.
22	0.	0.	0.	0.	0.
23	9300.	24913.	15845.	15613.	6545.
24	19000.	24712.	20370.	5712.	1370.
25	0.	0.	0.	0.	0.
26	6500.	11831.	7996.	5331.	1496.
27	0.	0.	0.	0.	0.
28	8400.	17920.	9460.	9520.	1060.
29	3000.	7950.	3192.	4950.	192.
30	5000.	10522.	5117.	5522.	117.
31	2400.	4114.	2431.	1714.	31.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	30082.	3472.	11382.
36	21300.	38816.	112599.	17516.	91299.
37	14000.	24381.	157879.	10381.	143879.
38	33700.	76673.	134858.	42973.	101158.
39	2950.	5806.	2984.	2856.	34.
40	9300.	23870.	20787.	14570.	11487.
41	12400.	24966.	16908.	12566.	4508.
42	2000.	3713.	2518.	1713.	518.
43	3000.	7570.	3411.	4570.	411.
44	0.	0.	0.	0.	0.
[illegible]	0.	0.	0.	0.	0.
[illegible]	17000.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1500.	[illegible]	2370.	3908.	870.
[illegible]	101000.	154312.	167370.	53312.	66370.
[illegible]	13000.	22520.	14015.	9520.	1015.
TOTAL	1085235.	[illegible]	1863966.	778443.	775740.

TABLE C.7 - POPULATION ALLOCATIONS: 1986 YORK PIPE

ZONE	GIVEN HHLDS	SI-H HHLDS	HOUSING BUDGET	ATTRACT FACTOR
1	87000.	75798.	[illegible]	[illegible]
2	270000.	267508.	270000.	270000.00
3	285000.	224471.	285000.	285000.00
4	158000.	137654.	158000.	158000.00
5	120000.	133185.	120000.	120000.00
6	145000.	121592.	145000.	145000.00
7	158000.	138085.	158000.	158000.00
8	68000.	64024.	68000.	68000.00
9	128000.	120807.	128000.	128000.00
10	112000.	93741.	112000.	112000.00
11	100000.	81306.	100000.	100000.00
12	132000.	126304.	132000.	132000.00
13	112000.	124474.	112000.	112000.00
14	169000.	167937.	169000.	169000.00
15	184000.	148562.	184000.	184000.00
16	195000.	148752.	195000.	195000.00
17	52000.	41463.	52000.	52000.00
18	74000.	59610.	74000.	74000.00
19	46000.	34973.	46000.	46000.00
20	194000.	277015.	194000.	194000.00
21	40000.	33770.	40000.	40000.00
22	0.	0.	0.	0.0
23	200000.	130185.	200000.	200000.00
24	200000.	127684.	200000.	200000.00
25	0.	0.	0.	0.0
26	90000.	66239.	90000.	90000.00
27	0.	0.	0.	0.0
28	193000.	127335.	193000.	193000.00
29	40000.	13185.	40000.	40000.00
30	29000.	11664.	29000.	29000.00
31	9000.	5459.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	21251.	18000.	18000.00
36	92000.	98344.	92000.	92000.00
37	54000.	68766.	54000.	54000.00
38	225000.	239444.	225000.	225000.00
39	15000.	9953.	15000.	15000.00
40	76000.	69752.	76000.	76000.00
41	66000.	57937.	66000.	66000.00
42	9000.	8190.	9000.	9000.00
43	24000.	17592.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	[illegible]	[illegible]	[illegible]	[illegible]
47	20000.	19317.	20000.	20000.00
48	280000.	328376.	280000.	280000.00
49	50000.	42673.	50000.	50000.00
TOTALS	4593000.	[illegible]	4593000.	4593000.00

TABLE C.8 - EMPLOYMENT ALLOCATIONS: 1986 YORK PIPE

ZONE	BASIC	TOTAL GIVEN	TOTAL SITED	TOTAL GIVEN	SERVICE SITED
1	119860.	136234.	132602.	16374.	12742.
2	101440.	152848.	108744.	51408.	7304.
3	17510.	71774.	33802.	54264.	16292.
4	92710.	122793.	101509.	30083.	8799.
5	37905.	60752.	52959.	22847.	15054.
6	38905.	66503.	49298.	27598.	10393.
7	23305.	53388.	55104.	30083.	31799.
8	30275.	43222.	39508.	12947.	9233.
9	58745.	83116.	73516.	24371.	14771.
10	44265.	65589.	54798.	21324.	10533.
11	7095.	26135.	17776.	19040.	10681.
12	11000.	36132.	62892.	25132.	51892.
13	22665.	43989.	65527.	21324.	42862.
14	33765.	65942.	56289.	32177.	22524.
15	25050.	60083.	44413.	35033.	19363.
16	33820.	70948.	53409.	37128.	19589.
17	5280.	15180.	25431.	9900.	20151.
18	6280.	20369.	26481.	14089.	20201.
19	9420.	18179.	15363.	8759.	5943.
20	59000.	95938.	131943.	36938.	72943.
21	7500.	15116.	11943.	7616.	4443.
22	0.	0.	0.	0.	0.
23	9300.	24913.	48629.	15613.	39329.
24	19000.	24712.	37293.	5712.	18293.
25	0.	0.	0.	0.	0.
26	6500.	11831.	18116.	5331.	11616.
27	0.	0.	0.	0.	0.
28	8400.	17920.	14350.	9520.	5950.
29	3000.	7950.	3757.	4950.	757.
30	5000.	10522.	5264.	5522.	264.
31	2400.	4114.	2464.	1714.	64.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	28203.	3472.	9503.
36	21300.	38816.	52819.	17516.	31519.
37	14000.	24381.	74782.	10381.	60782.
38	33700.	75773.	86056.	42073.	52356.
39	2900.	5756.	2922.	2856.	22.
40	9000.	23570.	27674.	14570.	18674.
41	12400.	24966.	18599.	12566.	6199.
42	2000.	3713.	2500.	1713.	500.
43	3000.	7570.	3613.	4570.	613.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	101000.	154312.	123497.	53312.	22497.
49	13000.	22520.	14310.	9520.	1310.
TOTALS	[illegible]	[illegible]	[illegible]	773443.	[illegible]

TABLE C.9 - POPULATION ALLOCATIONS: 1986 OSHAWA PIPE

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	72598.	86000.	86000.00
2	270000.	201581.	270000.	270000.00
3	285000.	214475.	285000.	285000.00
4	158000.	135017.	158000.	158000.00
5	120000.	98190.	120000.	120000.00
6	145000.	117074.	145000.	145000.00
7	158000.	132213.	158000.	158000.00
8	68000.	61803.	68000.	68000.00
9	128000.	117482.	128000.	128000.00
10	112000.	89833.	112000.	112000.00
11	100000.	77144.	100000.	100000.00
12	132000.	119599.	132000.	132000.00
13	112000.	122946.	112000.	112000.00
14	169000.	164387.	169000.	169000.00
15	184000.	140433.	184000.	184000.00
16	195000.	139382.	195000.	195000.00
17	52000.	38560.	52000.	52000.00
18	74000.	55901.	74000.	74000.00
19	46000.	32623.	46000.	46000.00
20	300000.	309948.	300000.	300000.00
21	150000.	123050.	150000.	150000.00
22	220000.	122002.	220000.	220000.00
23	240000.	145697.	240000.	240000.00
24	200000.	120366.	200000.	200000.00
25	0.	0.	0.	0.0
26	28000.	19542.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	31246.	50000.	50000.00
29	26000.	11159.	26000.	26000.00
30	29000.	10982.	29000.	29000.00
31	9000.	5246.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	20920.	18000.	18000.00
36	92000.	97850.	92000.	92000.00
37	54000.	68533.	54000.	54000.00
38	225000.	238051.	225000.	225000.00
39	15000.	7718.	15000.	15000.00
40	76000.	69142.	76000.	76000.00
41	66000.	57616.	66000.	66000.00
42	9000.	8126.	9000.	9000.00
43	24000.	17396.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	60616.	75000.	75000.00
47	20000.	18747.	20000.	20000.00
48	280000.	324196.	280000.	280000.00
49	50000.	42079.	50000.	50000.00
TOTALS	4850000.	4061447.	4850000.	4850000.00

TABLE C.10 - EMPLOYMENT ALLOCATIONS: 1986 OSHAWA PIPE

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	131313.	16374.	12453.
2	101440.	152848.	109473.	51408.	8033.
3	17510.	71774.	32457.	54264.	14947.
4	92710.	122793.	102145.	30083.	9435.
5	37905.	60753.	51655.	22848.	13750.
6	38895.	66503.	49614.	27608.	10719.
7	23305.	53388.	49049.	30083.	25744.
8	30275.	43222.	38725.	12947.	8450.
9	58745.	83116.	70636.	24371.	11891.
10	44265.	65589.	51497.	21324.	7232.
11	7095.	26135.	14107.	19040.	7012.
12	11000.	36132.	46322.	25132.	35322.
13	22665.	43989.	67635.	21324.	44970.
14	33765.	65942.	55538.	32177.	21773.
15	25050.	60083.	41493.	35033.	16443.
16	33820.	70948.	48538.	37128.	14718.
17	5280.	15180.	21340.	9900.	16060.
18	6280.	20369.	16839.	14089.	10559.
19	9420.	18179.	13335.	8759.	3915.
20	59000.	95938.	141021.	36938.	82021.
21	7500.	15116.	47932.	7616.	40432.
22	0.	0.	0.	0.	0.
23	9300.	24913.	43874.	15613.	34574.
24	19000.	24712.	65746.	5712.	46746.
25	0.	0.	0.	0.	0.
26	6500.	11831.	12375.	5331.	5875.
27	0.	0.	0.	0.	0.
28	8400.	17920.	9817.	9520.	1417.
29	3000.	7950.	3213.	4950.	213.
30	5000.	10522.	5123.	5522.	123.
31	2400.	4114.	2442.	1714.	42.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	26941.	3472.	8241.
36	21300.	38816.	52159.	17516.	30859.
37	14000.	24381.	76034.	10381.	62034.
38	33700.	76673.	88661.	42973.	54961.
39	2950.	5806.	2986.	2856.	36.
40	9300.	23870.	27931.	14570.	18631.
41	12400.	24966.	18825.	12566.	6425.
42	2000.	3713.	2503.	1713.	503.
43	3000.	7570.	3616.	4570.	616.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	21927.	14280.	4927.
47	1500.	5408.	2576.	3908.	1076.
48	101000.	154312.	182261.	53312.	81261.
49	13000.	22520.	14299.	9520.	1299.
TOTALS	1088235.	1866680.	1863962.	778443.	775738.

TABLE C.11 - POPULATION ALLOCATIONS: 1986 ALL PIPES

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	57810.	86000.	86000.00
2	270000.	160938.	270000.	270000.00
3	285000.	170728.	285000.	285000.00
4	158000.	109183.	158000.	158000.00
5	120000.	78041.	120000.	120000.00
6	145000.	93184.	145000.	145000.00
7	158000.	104826.	158000.	158000.00
8	68000.	49726.	68000.	68000.00
9	128000.	95829.	128000.	128000.00
10	112000.	72440.	112000.	112000.00
11	100000.	61807.	100000.	100000.00
12	132000.	95624.	132000.	132000.00
13	112000.	100772.	112000.	112000.00
14	169000.	134270.	169000.	169000.00
15	184000.	111384.	184000.	184000.00
16	195000.	110931.	195000.	195000.00
17	52000.	31089.	52000.	52000.00
18	74000.	44695.	74000.	74000.00
19	46000.	26088.	46000.	46000.00
20	300000.	279228.	300000.	300000.00
21	150000.	105055.	150000.	150000.00
22	220000.	102409.	220000.	220000.00
23	240000.	117838.	240000.	240000.00
24	200000.	97854.	200000.	200000.00
25	0.	0.	0.	0.0
26	90000.	50622.	90000.	90000.00
27	0.	0.	0.	0.0
28	193000.	97140.	193000.	193000.00
29	40000.	13780.	40000.	40000.00
30	43000.	13025.	43000.	43000.00
31	76000.	35892.	76000.	76000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	17425.	18000.	18000.00
36	275000.	251948.	275000.	275000.00
37	270000.	289093.	270000.	270000.00
38	440000.	387643.	440000.	440000.00
39	15000.	6755.	15000.	15000.00
40	76000.	54007.	76000.	76000.00
41	66000.	45959.	66000.	66000.00
42	9000.	6647.	9000.	9000.00
43	24000.	13793.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	49339.	75000.	75000.00
47	20000.	15439.	20000.	20000.00
48	280000.	266855.	280000.	280000.00
49	50000.	34349.	50000.	50000.00
TOTALS	5764000.	4061448.	5764000.	5764000.00

TABLE C.12 - EMPLOYMENT ALLOCATIONS: 1986 ALL PIPES

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	125385.	16374.	6525.
2	101440.	152848.	104531.	51408.	3091.
3	17510.	71774.	24978.	54264.	7468.
4	92710.	122793.	97663.	30083.	4953.
5	37905.	60753.	45376.	22848.	7471.
6	38895.	66503.	43495.	27608.	4600.
7	23305.	53388.	38016.	30083.	14711.
8	30275.	43222.	35422.	12947.	5147.
9	58745.	83116.	69671.	24371.	10926.
10	44265.	65589.	50720.	21324.	6455.
11	7095.	26135.	12698.	19040.	5603.
12	11000.	36132.	37606.	25132.	26606.
13	22665.	43989.	64909.	21324.	42244.
14	33765.	65942.	50476.	32177.	16711.
15	25050.	60083.	33912.	35033.	8862.
16	33820.	70948.	43161.	37128.	9341.
17	5280.	15180.	17568.	9900.	12288.
18	6280.	20369.	17568.	14089.	11288.
19	9420.	18179.	12557.	8759.	3137.
20	59000.	95938.	131299.	36938.	72299.
21	7500.	15116.	40630.	7616.	33130.
22	0.	0.	0.	0.	0.
23	9300.	24913.	34573.	15613.	25273.
24	19000.	24712.	59468.	5712.	40468.
25	0.	0.	0.	0.	0.
26	6500.	11831.	13796.	5331.	7296.
27	0.	0.	0.	0.	0.
28	8400.	17920.	11950.	9520.	3550.
29	3000.	7950.	3570.	4950.	570.
30	5000.	10522.	5236.	5522.	236.
31	2400.	4114.	2467.	1714.	67.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	30236.	3472.	11536.
36	21300.	38816.	104348.	17516.	83048.
37	14000.	24381.	140472.	10381.	126472.
38	33700.	76673.	115515.	42973.	31815.
39	2950.	5806.	2976.	2856.	26.
40	9300.	23870.	19926.	14570.	10626.
41	12400.	24966.	16192.	12566.	3792.
42	2000.	3713.	2445.	1713.	445.
43	3000.	7570.	3367.	4570.	367.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	20306.	14280.	3306.
47	1500.	5408.	2305.	3908.	805.
48	101000.	154312.	163266.	53312.	62266.
49	13000.	22520.	13920.	9520.	920.
TOTALS	1088235.	1866680.	1863963.	778443.	775738.

TABLE C.13 - POPULATION ALLOCATIONS: 1986 TRANSIT SKIM TREES

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	105121.	86000.	86000.00
2	270000.	324552.	270000.	270000.00
3	285000.	310845.	285000.	285000.00
4	158000.	172509.	158000.	158000.00
5	120000.	109961.	120000.	120000.00
6	145000.	176266.	145000.	145000.00
7	158000.	113411.	158000.	158000.00
8	68000.	55862.	68000.	68000.00
9	128000.	80310.	128000.	128000.00
10	112000.	70520.	112000.	112000.00
11	100000.	61219.	100000.	100000.00
12	132000.	92660.	132000.	132000.00
13	112000.	97088.	112000.	112000.00
14	169000.	133585.	169000.	169000.00
15	184000.	159977.	184000.	184000.00
16	195000.	164952.	195000.	195000.00
17	52000.	26670.	52000.	52000.00
18	74000.	41573.	74000.	74000.00
19	46000.	25528.	46000.	46000.00
20	194000.	347807.	194000.	91329.38
21	40000.	76651.	40000.	40000.00
22	0.	0.	0.	0.0
23	82000.	60377.	82000.	82000.00
24	30000.	18277.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	13245.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	22928.	50000.	50000.00
29	26000.	12068.	26000.	26000.00
30	29000.	13530.	29000.	29000.00
31	9000.	4000.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	31576.	18000.	18000.00
36	92000.	151607.	92000.	92000.00
37	54000.	33965.	54000.	54000.00
38	225000.	209096.	225000.	225000.00
39	15000.	11977.	15000.	15000.00
40	76000.	78361.	76000.	76000.00
41	66000.	79208.	66000.	66000.00
42	9000.	4679.	9000.	9000.00
43	24000.	15583.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	74642.	75000.	75000.00
47	20000.	10776.	20000.	20000.00
48	280000.	433981.	280000.	280000.00
49	50000.	32558.	50000.	50000.00
TOTALS	4086000.	4059702.	4086000.	3963329.00

TABLE C.14 - EMPLOYMENT ALLOCATIONS: 1986 TRANSIT SKIM TREES

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	173846.	16374.	54986.
2	101440.	152848.	192705.	51408.	91265.
3	17510.	71774.	61535.	54264.	44025.
4	92710.	122793.	116101.	30083.	23391.
5	37905.	60753.	45412.	22848.	7507.
6	38895.	66503.	95771.	27608.	56876.
7	23305.	53388.	27861.	30083.	4556.
8	30275.	43222.	31442.	12947.	1167.
9	58745.	83116.	58994.	24371.	249.
10	44265.	65589.	44602.	21324.	337.
11	7095.	26135.	7629.	19040.	534.
12	11000.	36132.	14422.	25132.	3422.
13	22665.	43989.	26025.	21324.	3360.
14	33765.	65942.	37513.	32177.	3748.
15	25050.	60083.	44960.	35033.	19910.
16	33820.	70948.	52447.	37128.	18627.
17	5280.	15180.	5324.	9900.	44.
18	6280.	20369.	6652.	14089.	372.
19	9420.	18179.	9537.	8759.	117.
20	59000.	95938.	164178.	36938.	105178.
21	7500.	15116.	35504.	7616.	28004.
22	0.	0.	0.	0.	0.
23	9300.	24913.	18054.	15613.	8754.
24	19000.	24712.	19496.	5712.	496.
25	0.	0.	0.	0.	0.
26	6500.	11831.	6555.	5331.	55.
27	0.	0.	0.	0.	0.
28	8400.	17920.	8805.	9520.	405.
29	3000.	7950.	4155.	4950.	1155.
30	5000.	10522.	6396.	5522.	1396.
31	2400.	4114.	2402.	1714.	2.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	29579.	3472.	10879.
36	21300.	38816.	64387.	17516.	43087.
37	14000.	24381.	14778.	10381.	778.
38	33700.	76673.	85965.	42973.	52265.
39	2950.	5806.	3019.	2856.	69.
40	9300.	23870.	29676.	14570.	20376.
41	12400.	24966.	41414.	12566.	29014.
42	2000.	3713.	2431.	1713.	431.
43	3000.	7570.	5854.	4570.	2854.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	32834.	14280.	15834.
47	1500.	5408.	1515.	3908.	15.
48	101000.	154312.	217964.	53312.	116964.
49	13000.	22520.	15908.	9520.	2908.
TOTALS	1088235.	1866680.	1863630.	778443.	775407.

TABLE C.15 - POPULATION ALLOCATIONS: 1986 TRANSIT OPTION 4A

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	101345.	86000.	86000.00
2	270000.	312136.	270000.	270000.00
3	285000.	296575.	285000.	285000.00
4	158000.	169289.	158000.	158000.00
5	120000.	104634.	120000.	120000.00
6	145000.	168380.	145000.	145000.00
7	158000.	107000.	158000.	158000.00
8	68000.	51801.	68000.	68000.00
9	128000.	86193.	128000.	128000.00
10	112000.	80104.	112000.	112000.00
11	100000.	73925.	100000.	100000.00
12	132000.	86909.	132000.	132000.00
13	112000.	91477.	112000.	112000.00
14	169000.	134425.	169000.	169000.00
15	184000.	149277.	184000.	184000.00
16	195000.	155956.	195000.	195000.00
17	52000.	28543.	52000.	52000.00
18	74000.	40285.	74000.	74000.00
19	46000.	35452.	46000.	46000.00
20	194000.	342955.	194000.	95536.38
21	40000.	52193.	40000.	19074.30
22	0.	0.	0.	0.0
23	82000.	66965.	82000.	82000.00
24	30000.	17985.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	12150.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	21264.	50000.	50000.00
29	26000.	11069.	26000.	26000.00
30	29000.	12383.	29000.	29000.00
31	9000.	3674.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	28705.	18000.	18000.00
36	92000.	147848.	92000.	92000.00
37	54000.	30780.	54000.	54000.00
38	225000.	203617.	225000.	225000.00
39	15000.	11243.	15000.	15000.00
40	76000.	68395.	76000.	76000.00
41	66000.	70286.	66000.	66000.00
42	9000.	4306.	9000.	9000.00
43	24000.	14165.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	138375.	75000.	75000.00
47	20000.	9757.	20000.	20000.00
48	280000.	456362.	280000.	280000.00
49	50000.	59576.	50000.	50000.00
TOTALS	4086000.	4058178.	4086000.	3966610.00

TABLE C.16 - EMPLOYMENT ALLOCATIONS: 1986 TRANSIT OPTION 4A

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118850.	135224.	180573.	16374.	61723.
2	101440.	152848.	135977.	51408.	34537.
3	17510.	71774.	54025.	54264.	36515.
4	92710.	122793.	117015.	30083.	24305.
5	37905.	60753.	44140.	22848.	6235.
6	38895.	66503.	90323.	27608.	51428.
7	23305.	53388.	26966.	30083.	3661.
8	30275.	43222.	30850.	12947.	575.
9	58745.	83116.	58955.	24371.	210.
10	44265.	65589.	45192.	21324.	927.
11	7095.	26135.	10406.	19040.	3311.
12	11000.	36132.	13191.	25132.	2191.
13	22665.	43989.	24727.	21324.	2062.
14	33765.	65942.	36897.	32177.	3132.
15	25050.	60083.	39887.	35033.	14837.
16	33820.	70948.	48105.	37128.	14285.
17	5280.	15180.	5398.	9900.	118.
18	6280.	20369.	6585.	14089.	305.
19	9420.	18179.	12446.	8759.	3026.
20	59000.	95938.	162049.	36938.	103049.
21	7500.	15116.	33117.	7616.	25617.
22	0.	0.	0.	0.	0.
23	9300.	24913.	15012.	15613.	5712.
24	19000.	24712.	19217.	5712.	217.
25	0.	0.	0.	0.	0.
26	6500.	11831.	6517.	5331.	17.
27	0.	0.	0.	0.	0.
28	8400.	17920.	8591.	9520.	191.
29	3000.	7950.	3757.	4950.	757.
30	5000.	10522.	5924.	5522.	924.
31	2400.	4114.	2400.	1714.	0.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	32556.	3472.	13856.
36	21300.	38816.	64578.	17516.	43278.
37	14000.	24381.	14357.	10381.	357.
38	33700.	76673.	80277.	42973.	46577.
39	2950.	5806.	2977.	2856.	27.
40	9300.	23870.	24926.	14570.	15626.
41	12400.	24968.	36860.	12568.	24460.
42	2000.	3713.	2297.	1713.	297.
43	3000.	7570.	5502.	4570.	2502.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	75939.	14280.	58939.
47	1500.	5408.	1503.	3908.	3.
48	101000.	154312.	217407.	53312.	116407.
49	13000.	22520.	16082.	9520.	3082.
TOTALS	1088235.	1866678.	1863493.	778443.	775258.

TABLE C.17 - POPULATION ALLOCATIONS: 1986 TRANSIT OPTION 4B

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	99624.	86000.	86000.00
2	270000.	308221.	270000.	270000.00
3	285000.	295407.	285000.	285000.00
4	158000.	165319.	158000.	158000.00
5	120000.	105262.	120000.	120000.00
6	145000.	167102.	145000.	145000.00
7	158000.	108373.	158000.	158000.00
8	68000.	52218.	68000.	68000.00
9	128000.	86956.	128000.	128000.00
10	112000.	80863.	112000.	112000.00
11	100000.	74676.	100000.	100000.00
12	132000.	87854.	132000.	132000.00
13	112000.	92179.	112000.	112000.00
14	169000.	135376.	169000.	169000.00
15	184000.	150692.	184000.	184000.00
16	195000.	156442.	195000.	195000.00
17	52000.	28893.	52000.	52000.00
18	74000.	41382.	74000.	74000.00
19	46000.	34847.	46000.	46000.00
20	194000.	345170.	194000.	94845.31
21	40000.	52426.	40000.	18852.80
22	0.	0.	0.	0.0
23	82000.	67885.	82000.	82000.00
24	30000.	18210.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	12300.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	21536.	50000.	50000.00
29	26000.	11213.	26000.	26000.00
30	29000.	12543.	29000.	29000.00
31	9000.	3722.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	28878.	18000.	18000.00
36	92000.	149398.	92000.	92000.00
37	54000.	31800.	54000.	54000.00
38	225000.	196135.	225000.	225000.00
39	15000.	11371.	15000.	15000.00
40	76000.	69693.	76000.	76000.00
41	66000.	74022.	66000.	66000.00
42	9000.	4359.	9000.	9000.00
43	24000.	14365.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	139639.	75000.	75000.00
47	20000.	9869.	20000.	20000.00
48	280000.	452832.	280000.	280000.00
49	50000.	59336.	50000.	50000.00
TOTALS	4086000.	4058981.	4086000.	3965697.00

TABLE C.18 - EMPLOYMENT ALLOCATIONS: 1986 TRANSIT OPTION 4B

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118860.	135234.	176436.	16374.	57576.
2	101440.	152848.	183075.	51408.	81635.
3	17510.	71774.	55027.	54264.	37517.
4	92710.	122793.	114366.	30083.	21656.
5	37905.	60753.	44683.	22848.	6778.
6	38895.	66503.	90639.	27608.	51744.
7	23305.	53388.	27300.	30083.	3995.
8	30275.	43222.	30905.	12947.	630.
9	58745.	83116.	58974.	24371.	229.
10	44265.	65589.	45270.	21324.	1005.
11	7095.	26135.	10683.	19040.	3588.
12	11000.	36132.	13367.	25132.	2367.
13	22665.	43989.	24957.	21324.	2292.
14	33765.	65942.	37204.	32177.	3439.
15	25050.	60083.	41132.	35033.	16082.
16	33820.	70948.	48745.	37128.	14925.
17	5280.	15180.	5407.	9900.	127.
18	6280.	20369.	6612.	14089.	332.
19	9420.	18179.	12224.	8759.	2804.
20	59000.	95938.	163368.	36938.	104368.
21	7500.	15116.	33504.	7616.	26004.
22	0.	0.	0.	0.	0.
23	9300.	24913.	15219.	15613.	5919.
24	19000.	24712.	19229.	5712.	229.
25	0.	0.	0.	0.	0.
26	6500.	11831.	6519.	5331.	19.
27	0.	0.	0.	0.	0.
28	8400.	17920.	8608.	9520.	208.
29	3000.	7950.	3801.	4950.	801.
30	5000.	10522.	5975.	5522.	975.
31	2400.	4114.	2400.	1714.	0.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	32767.	3472.	14067.
36	21300.	38816.	65309.	17516.	44009.
37	14000.	24381.	14442.	10381.	442.
38	33700.	76673.	80942.	42973.	47242.
39	2950.	5806.	2979.	2856.	29.
40	9300.	23870.	25556.	14570.	16256.
41	12400.	24966.	39537.	12566.	27137.
42	2000.	3713.	2310.	1713.	310.
43	3000.	7570.	5553.	4570.	2553.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	80417.	14280.	63417.
47	1500.	5408.	1504.	3908.	4.
48	101000.	154312.	210122.	53312.	109122.
49	13000.	22520.	16419.	9520.	3419.
TOTALS	1088235.	1866680.	1863491.	778443.	775258.

TABLE C.19 - POPULATION ALLOCATIONS: 1986 TRANSIT OPTION 6

ZONE	GIVEN HHLDS	SIM-N HHLDS	HOUSING OPPORT	ATTRACT FACTOR
1	86000.	100958.	86000.	86000.00
2	270000.	311330.	270000.	270000.00
3	285000.	295144.	285000.	285000.00
4	158000.	169055.	158000.	158000.00
5	120000.	104107.	120000.	120000.00
6	145000.	167544.	145000.	145000.00
7	158000.	106465.	158000.	158000.00
8	68000.	51602.	68000.	68000.00
9	128000.	87194.	128000.	128000.00
10	112000.	80769.	112000.	112000.00
11	100000.	74047.	100000.	100000.00
12	132000.	86509.	132000.	132000.00
13	112000.	91156.	112000.	112000.00
14	169000.	134746.	169000.	169000.00
15	184000.	145715.	184000.	184000.00
16	195000.	155026.	195000.	195000.00
17	52000.	28246.	52000.	52000.00
18	74000.	40670.	74000.	74000.00
19	46000.	36625.	46000.	46000.00
20	194000.	342200.	194000.	95513.38
21	40000.	51956.	40000.	19170.34
22	0.	0.	0.	0.0
23	82000.	66520.	82000.	82000.00
24	30000.	18438.	30000.	30000.00
25	0.	0.	0.	0.0
26	28000.	12082.	28000.	28000.00
27	0.	0.	0.	0.0
28	50000.	23162.	50000.	50000.00
29	26000.	11015.	26000.	26000.00
30	29000.	12322.	29000.	29000.00
31	9000.	3655.	9000.	9000.00
32	0.	0.	0.	0.0
33	0.	0.	0.	0.0
34	0.	0.	0.	0.0
35	18000.	32547.	18000.	18000.00
36	92000.	149187.	92000.	92000.00
37	54000.	32237.	54000.	54000.00
38	225000.	203141.	225000.	225000.00
39	15000.	11202.	15000.	15000.00
40	76000.	68168.	76000.	76000.00
41	60000.	72233.	60000.	60000.00
42	9000.	4776.	9000.	9000.00
43	24000.	14369.	24000.	24000.00
44	0.	0.	0.	0.0
45	0.	0.	0.	0.0
46	75000.	137695.	75000.	75000.00
47	20000.	9721.	20000.	20000.00
48	280000.	454950.	280000.	280000.00
49	50000.	59217.	50000.	50000.00
TOTALS	4086000.	4058962.	4086000.	3966683.00

TABLE C.20 - EMPLOYMENT ALLOCATIONS: 1986 TRANSIT OPTION 6

ZONE	BASIC	TOTAL GIVEN	TOTAL SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	118850.	135224.	179874.	16374.	61024.
2	101440.	152848.	185051.	51408.	83611.
3	17510.	71774.	53457.	54264.	35947.
4	92710.	122793.	116493.	30083.	23783.
5	37905.	60753.	44005.	22848.	6100.
6	38895.	66503.	89557.	27608.	50662.
7	23305.	53388.	26868.	30083.	3563.
8	30275.	43222.	30831.	12947.	556.
9	58745.	83116.	58949.	24371.	204.
10	44265.	65589.	45158.	21324.	893.
11	7095.	26135.	10279.	19040.	3184.
12	11000.	36132.	13128.	25132.	2128.
13	22665.	43989.	24658.	21324.	1993.
14	33765.	65942.	36780.	32177.	3015.
15	25050.	60083.	39664.	35033.	14614.
16	33820.	70948.	47788.	37128.	13968.
17	5280.	15180.	5390.	9900.	110.
18	6280.	20369.	6574.	14089.	294.
19	9420.	16179.	12610.	6759.	3190.
20	59000.	95938.	162094.	36938.	103094.
21	7500.	15116.	33023.	7616.	25523.
22	0.	0.	0.	0.	0.
23	9300.	24913.	14761.	15613.	5461.
24	19000.	24712.	19211.	5712.	211.
25	0.	0.	0.	0.	0.
26	6500.	11831.	6516.	5331.	16.
27	0.	0.	0.	0.	0.
28	8400.	17920.	8585.	9520.	185.
29	3000.	7950.	3740.	4950.	740.
30	5000.	10522.	5904.	5522.	904.
31	2400.	4114.	2400.	1714.	0.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	18700.	22172.	40404.	3472.	21704.
36	21300.	38816.	64530.	17516.	43230.
37	14000.	24381.	14178.	10381.	178.
38	33700.	76673.	77032.	42973.	43332.
39	2950.	5806.	2976.	2856.	26.
40	9300.	23870.	24585.	14570.	15285.
41	12400.	24966.	39283.	12566.	26883.
42	2000.	3713.	2019.	1713.	19.
43	3000.	7570.	5425.	4570.	2425.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	17000.	31280.	75309.	14280.	58309.
47	1500.	5408.	1503.	3908.	3.
48	101000.	154312.	216793.	53312.	115793.
49	13000.	22520.	16031.	9520.	3031.
TOTALS	1088255.	1861700.	1863494.	773445.	775259.

TABLE C.21 - POPULATION ALLOCATIONS: 2001 COLUC BASE

ZONE	GIVEN HHLDS.	SIM-N HHLDS.	HOUSING OPP.	ATTRACT.FACTOR
1	86000.	92736.	86000.	86000.
2	274000.	268445.	274000.	274000.
3	302000.	292213.	302000.	302000.
4	158000.	170008.	158000.	158000.
5	120000.	126565.	120000.	120000.
6	149000.	157894.	149000.	149000.
7	170000.	183291.	170000.	170000.
8	68000.	79072.	68000.	68000.
9	130000.	147364.	130000.	130000.
10	118000.	121741.	118000.	118000.
11	110000.	109920.	110000.	110000.
12	145000.	167694.	145000.	145000.
13	128000.	164482.	128000.	128000.
14	172000.	202831.	172000.	172000.
15	195000.	192511.	195000.	195000.
16	215000.	199180.	215000.	215000.
17	62000.	59174.	62000.	62000.
18	88000.	85767.	88000.	88000.
19	60000.	54855.	60000.	60000.
20	280000.	368456.	280000.	280000.
21	80000.	86381.	80000.	80000.
22	0.	0.	0.	0.
23	135000.	105635.	135000.	135000.
24	120000.	93519.	120000.	120000.
25	0.	0.	0.	0.
26	51000.	46101.	51000.	51000.
27	0.	0.	0.	0.
28	80000.	64650.	80000.	80000.
29	35000	19887.	35000.	35000.
30	40000.	20173.	40000.	40000.
31	27000.	20197.	27000.	27000.
32	0.	0.	0.	0.
33	0.	0.	0.	0.
34	0.	0.	0.	0.
35	30000.	40128.	30000.	30000.
36	150000.	161874.	150000.	150000.
37	186000.	252023.	186000.	186000.
38	360000.	416636.	360000.	360000.
39	75000.	60042.	75000.	75000.
40	90000.	91227.	90000.	90000.
41	90000.	86726.	90000.	90000.
42	11000.	11009.	11000.	11000.
43	45000.	37754.	45000.	45000.
44	0.	0.	0.	0.
45	0.	0.	0.	0.
46	120000.	112295.	120000.	120000.
47	40000.	40588.	40000.	40000.
48	340000.	414966.	340000.	340000.
49	100000.	94957.	100000.	100000.
TOTALS:	5235000.	5520945.	5235000.	5235000.

CORRELATION COEFFICIENT = 0.98253

TABLE C.22 - EMPLOYMENT ALLOCATIONS: 2001 COLUC BASE

ONE	BASIC	TOTAL GIVEN	TOT. SIM-N	TOTAL GIVEN	SERVICE SIM-N
1	126000.	233377.	202508.	107377.	76508.
2	107000.	198185.	124185.	91185.	17185.
3	22000.	40748.	28470.	18748.	6470.
4	96000.	177811.	125148.	81811.	29148.
5	42000.	77792.	63719.	35792.	21719.
6	43000.	79645.	57063.	36645.	14063.
7	27000.	50009.	45606.	23009.	18606.
8	36000.	66679.	55772.	30679.	19772.
9	80000.	148176.	122236.	68176.	42236.
10	60000.	111132.	82825.	51132.	22825.
11	10000.	18522.	14006.	8522.	4006.
12	15000.	27783.	30897.	12783.	15897.
13	31000.	57418.	84454.	26418.	53454.
14	46000.	85201.	75939.	39201.	29939.
15	34000.	62975.	49440.	28975.	15440.
16	46000.	85201.	65663.	39201.	19663.
17	8000.	14818.	15549.	6818.	7549.
18	9000.	16670.	15377.	7670.	6377.
19	13000.	24079.	19107.	11079.	6107.
20	74000.	137063.	206992.	63063.	132992.
21	18000.	33340.	40169.	15340.	22169.
22	0.	0.	0.	0.	0.
23	25000.	46305.	48249.	21305.	23249.
24	35000.	64827.	66743.	29827.	31743.
5	0.	0.	0.	0.	0.
26	7000.	12965.	12185.	5965.	5185.
27	0.	0.	0.	0.	0.
28	10000.	18522.	12858.	8522.	2858.
29	5000.	9261.	5781.	4261.	781.
30	6000.	11132.	6597.	5132.	597.
31	3000.	5557.	3197.	2557.	197.
32	0.	0.	0.	0.	0.
33	0.	0.	0.	0.	0.
34	0.	0.	0.	0.	0.
35	30000.	55566.	91905.	25566.	61905.
36	28000.	51862.	83026.	23862.	55026.
37	27000.	50009.	173110.	23009.	146110.
38	59000.	109280.	155627.	50280.	96627.
39	11000.	20374.	13068.	9374.	2068.
40	16000.	29635.	38158.	13635.	22158.
41	18000.	33340.	30724.	15340.	12724.
42	3000.	55557.	4551.	2557.	1551.
43	10000.	18522.	13295.	8522.	3295.
44	0.	0.	0.	0.	0.
45	0.	0.	0.	0.	0.
46	25000.	46305.	38720.	21305.	13720.
47	8000.	14818.	10794.	6818.	2794.
48	116000.	214855.	245422.	98855.	129422.
49	25000.	46305.	31676.	21305.	6676.
LS	1410000.	2611621.	2610792.	1201614.	1200805.

APPENDIX D - CHARACTERISTICS OF TRANSPORT POLICY ALTERNATIVES

The alternative transport policies proposed for the COLUC Region are reflected in changes in the travel times between centre zone pairs. Each of the alternatives is described below in terms of the changes in the travel times between selected zone pairs.

POLICY ALTERNATIVE	ZONE PAIRS INFLUENCED	1986 BASE ROAD	1986 BASE TRANSIT	POLICY CHANGE
1. GO Transit extension Pickering-Oshawa	23-21	22	29	29
	23-20	26	45	41
	21-20	18	36	32
2. Airport low speed triangle	35-9	15	74	39
	35-10	22	91	40
	35-11	25	87	44
	35-12	23	77	59
	35-18	31	82	66
	35-19	34	92	65
	35-24	44	100	94
	24-19	23	57	35
	24-15	30	91	56
	24-17	16	56	57
3. Airport high speed triangle	35-11	25	87	44
	35-19	34	92	61
	35-1	32	52	52
4a. Lakeshore high speed: Hamilton-Oshawa	1-20	44	92	63
	1-23	32	69	62
	1-38	27	59	48
	1-48	61	115	67
	20-48	98	173	86
4b. Lakeshore high speed: Union Station-Oshawa	1-23	32	69	62
	1-20	44	92	63
5. Airport high speed flanks	35-37	14	61	43
	35-48	50	133	159
	24-20	27	53	49

Continued/...

	POLICY ALTERNATIVE	ZONE PAIRS INFLUENCED	1986 BASE ROAD	1986 BASE TRANSIT	POLICY CHANGE
6.	Airport flank and north-south feeders	35-37	14	61	43
		35-38	20	68	52
		35-42	23	79	69
		35-43	39	137	117

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